

FIG. 1(a)

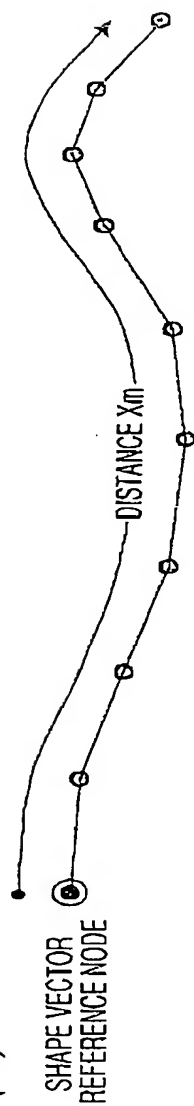


FIG. 1(b) QUANTIZATION OF SAMPLING POINTS IN THE DIRECTION OF DISTANCE



FIG. 1(c) QUANTIZATION OF TRAFFIC INFORMATION (SPEED)



FIG. 1(d) DIFFERENCE REPRESENTATION OF STATISTICAL PREDICTION VALUE



FIG. 2

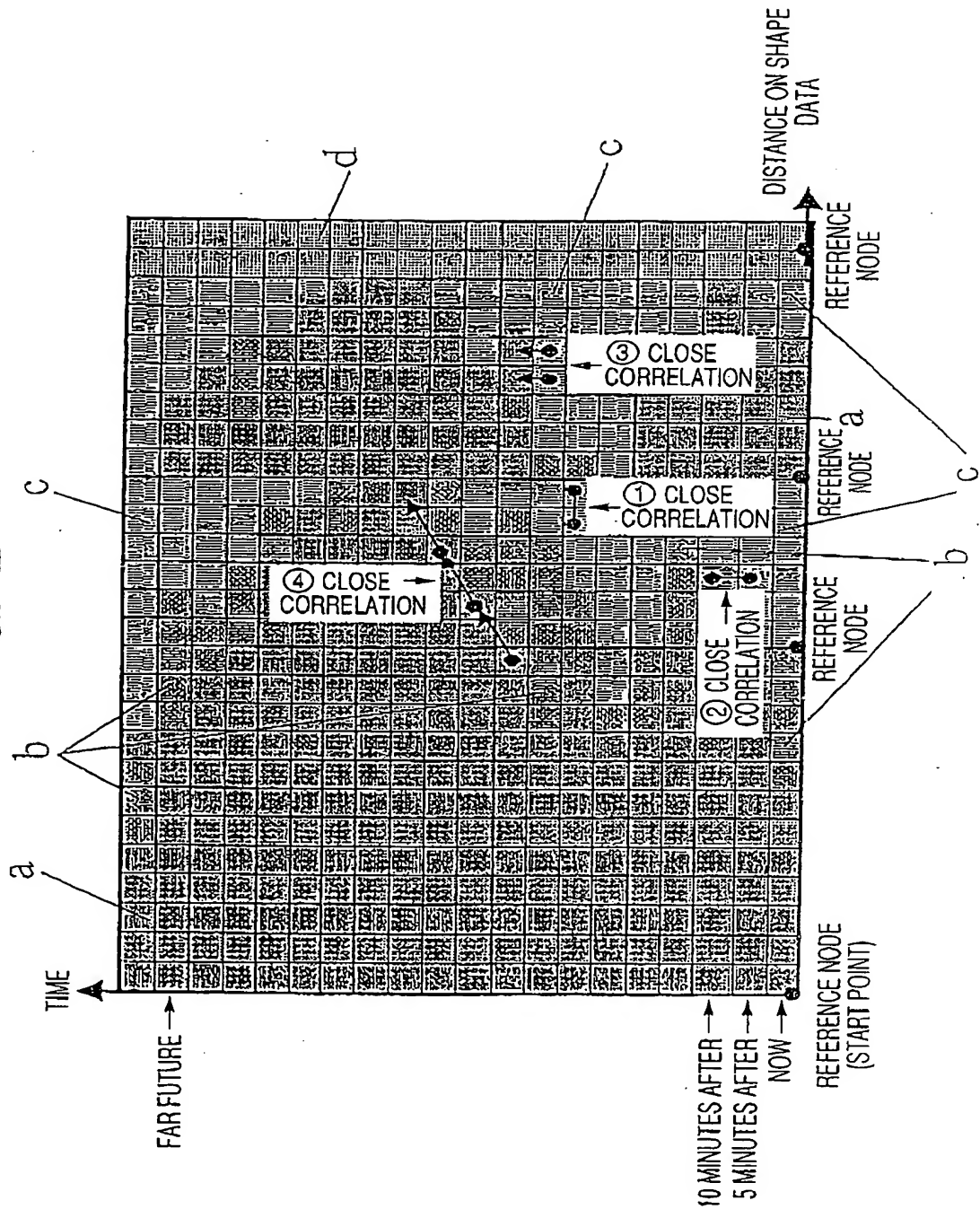


FIG. 3

TRAFFIC INFORMATION
QUANTIZATION TABLE
(SPEED QUANTIZATION TABLE)

QUANTIZED VOLUME	SPEED (km/h)
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10~11
11	12~13
12	14~15
13	16~17
14	18~19
15	20~24
16	25~29
17	30~34
18	35~39
19	40~44
20	45~49
21	50~59
22	60~69
23	70~79
24	80~99
}	
30	200 OR MORE

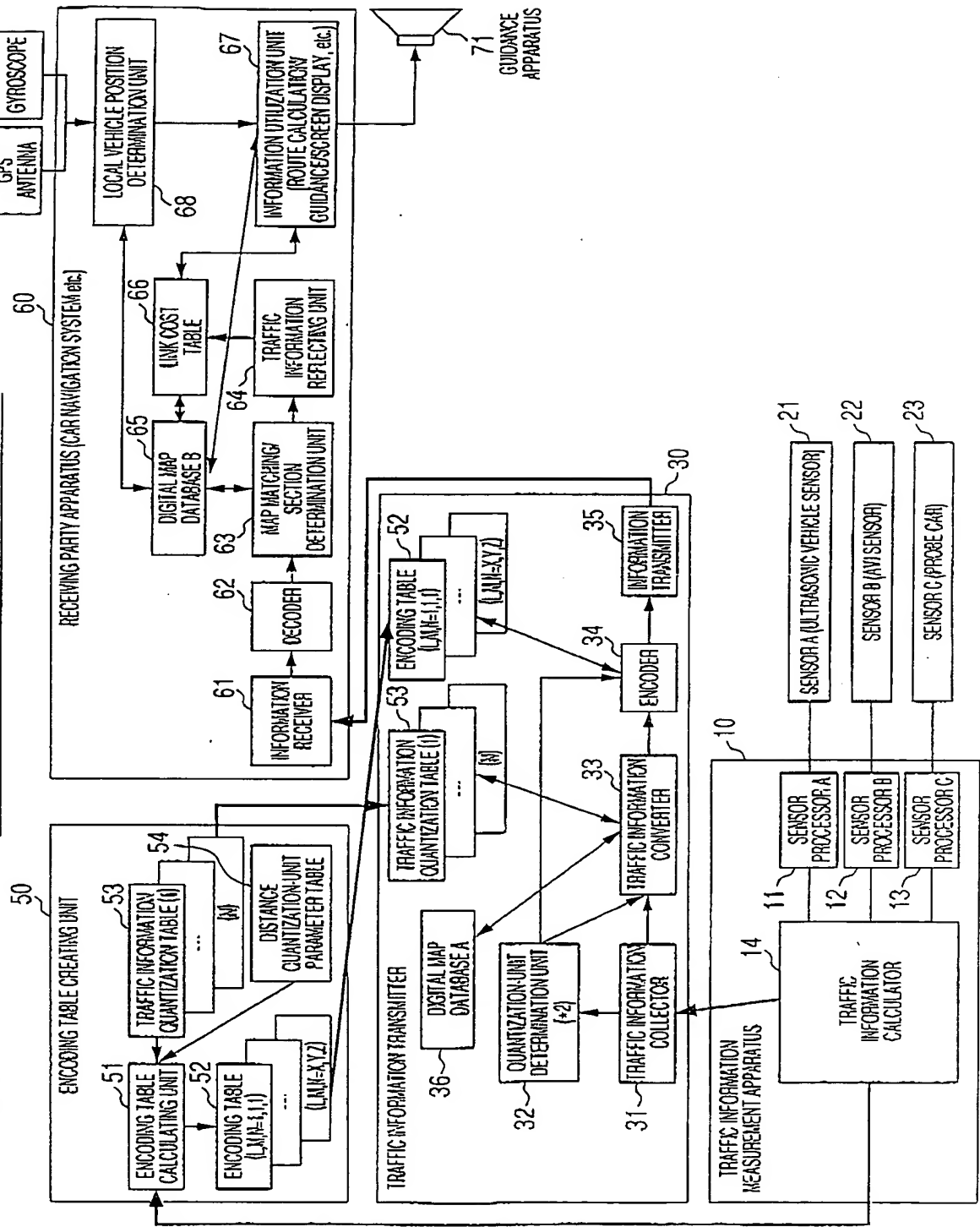
FIG. 4

EXAMPLE OF ENCODING TABLE OF STATISTICAL PREDICTION
DIFFERENCE VALUE OF TRAFFIC INFORMATION

SPECIAL CODE		CODE	ADDITIONAL BIT	
SECTION LENGTH CHANGE CODE		101	3 (40/80/160/.../5120m)	
TRAFFIC INFORMATION QUANTIZATION TABLE CHANGE CODE		111110	4 (TABLE NUMBER)	
IDENTIFICATION CODE FOR A POINT CORRESPONDING TO REFERENCE NODE		1100	6 (CORRESPONDING REFERENCE NODE NUMBER) + 8 (OFFSET DISTANCE FROM REFERENCE NODE)	
ENCODING TABLE FOR STATISTICAL PREDICTION DIFFERENCE VALUES OF TRAFFIC INFORMATION		CODE	ADDITIONAL BIT I	ADDITIONAL BIT II (RANGE)
RUN LENGTH	CHANGE VOLUME			
0	0	0	0	-
5	0	100	0	-
10	0	1101	0	-
0	± 1	1110	1 (\pm IDENTIFICATION)	0
0	± 2	111100	1 (\pm IDENTIFICATION)	0
0	± 4	111101	1 (\pm IDENTIFICATION)	1 (3 OR 4)
{				

FIG. 5

EXAMPLE OF APPARATUS CONFIGURATION
(APPLICATION TO CAR NAVIGATION SYSTEM)



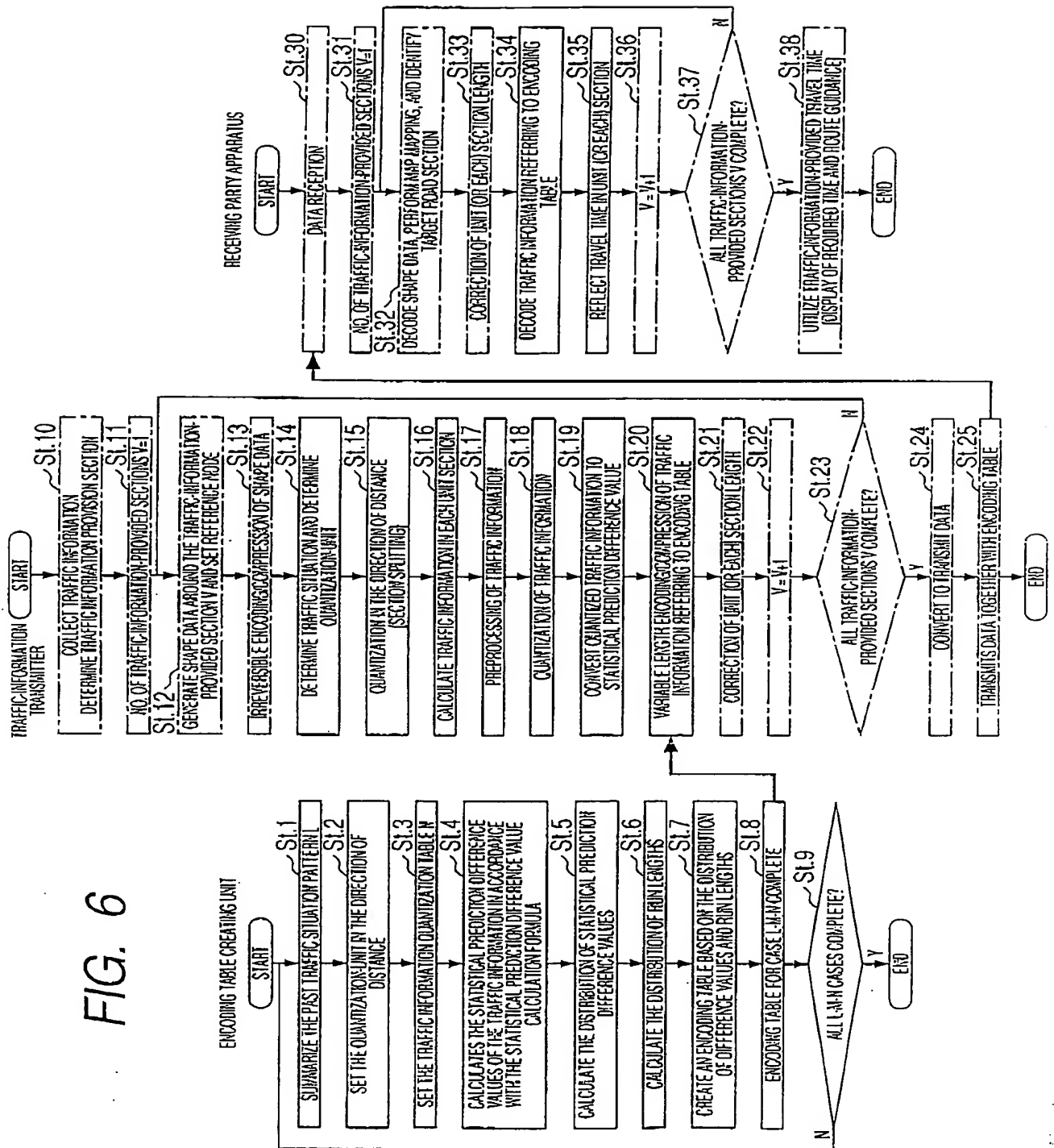


FIG. 7(a)

EXAMPLE OF MAP DATA STRUCTURE

MANAGEMENT INFORMATION (INFORMATION TYPE/BLOCK DEFINITION, ETC.)	
NO. OF NODES N	
NODE NUMBER 1	
NODE ATTRIBUTE INFORMATION OF NODE 1	
LONGITUDE OF NODE 1	LATITUDE OF NODE 1
NO. OF NODES CONNECTED TO NODE 1	
CONNECTING NODE NUMBER #1	LINK NUMBER #1-1
§	
CONNECTING NODE NUMBER #m	LINK NUMBER #1-m
§ §	
NODE NUMBER N	
NODE ATTRIBUTE INFORMATION OF NODE N	
LONGITUDE OF NODE N	LATITUDE OF NODE N
NO. OF NODES CONNECTED TO NODE N	
CONNECTING NODE NUMBER #1	LINK NUMBER #N-1
§	
CONNECTING NODE NUMBER #m	LINK NUMBER #N-m
NO. OF LINK L	
LINK NUMBER 1	
LINK ATTRIBUTE INFORMATION OF LINK 1	
NO. OF COMPONENT INTERPOLATION POINTS OF LINK 1	
LONGITUDE OF INTERPOLATION POINT 1-1	LATITUDE OF INTERPOLATION POINT 1-1
§	
LONGITUDE OF INTERPOLATION POINT 1-p	LATITUDE OF INTERPOLATION POINT 1-p
§ §	
LINK NUMBER L	
LINK ATTRIBUTE INFORMATION OF LINK L	
NO. OF COMPONENT INTERPOLATION POINTS OF LINK L	
LONGITUDE OF INTERPOLATION POINT L-1	LATITUDE OF INTERPOLATION POINT L-1
~	
LONGITUDE OF INTERPOLATION POINT L-p	LATITUDE OF INTERPOLATION POINT L-p

FIG. 7(b)

EXAMPLE OF TRAFFIC INFORMATION DATA
(EXAMPLE OF TRAVEL TIME/SPEED)

MAP DATA LINK NUMBER 1	
CURRENT: TRAVEL TIME	CURRENT: SPEED
5 MINUTES AFTER: TRAVEL TIME	5 MINUTES AFTER: SPEED
10 MINUTES AFTER: TRAVEL TIME	10 MINUTES AFTER: SPEED
§	
Z MINUTES AFTER: TRAVEL TIME	Z MINUTES AFTER: SPEED
§ §	
MAP DATA LINK NUMBER K	
CURRENT: TRAVEL TIME	CURRENT: SPEED
5 MINUTES AFTER: TRAVEL TIME	5 MINUTES AFTER: SPEED
10 MINUTES AFTER: TRAVEL TIME	10 MINUTES AFTER: SPEED
§	
Z MINUTES AFTER: TRAVEL TIME	Z MINUTES AFTER: SPEED
§ §	

FIG. 8(a)

SHAPE DATA STRING INFORMATION
(CODING/COMPRESSION DATA)

HEADER INFORMATION	
NO. OF SHAPE DATA N	
SHAPE DATA IDENTIFICATION NUMBER=1	
ENCODING TABLE IDENTIFICATION CODE	
ACCURACY INFORMATION OF MAP DATA AT SHAPE SOURCE	
DIRECTION OF ONE-WAY TRAFFIC (FORWARD/BACKWARD/NONE)	
BEGINNING NODE NUMBER ps	
NODE ps X DIRECTION ABSOLUTE COORDINATE (LONGITUDE)	
NODE ps Y DIRECTION ABSOLUTE COORDINATE (LATITUDE)	
NODE ps ABSOLUTE BEARING	
ps POSITION ERROR (m)	ps BEARING ERROR (°)
MAXIMUM POSITION ERROR OF ENCODED SHAPE DATAT (m)	MAXIMUM BEARING ERROR OF ENCODED SHAPE DATAT (°)
ENCODED SHAPE DATA INCLUDES THE FOLLOWING INFORMATION: · REFERENCE NODE SETTING CODE · SECTION LENGTH CHANGE CODE · EOD CODE	
END NODE NUMBER pe	
NODE pe X DIRECTION RELATIVE COORDINATE (LONGITUDE)	
NODE pe Y DIRECTION RELATIVE COORDINATE (LATITUDE)	
NODE pe ABSOLUTE BEARING	
pe POSITION ERROR (m)	pe BEARING ERROR (°)
§	
SHAPE DATA IDENTIFICATION NUMBER=M	
§	

FIG. 8(b)

TRAFFIC INFORMATION

HEADER INFORMATION	
NO. OF TRAFFIC-INFORMATION-PROVIDED SECTIONS	
TRAFFIC-INFORMATION-PROVIDED SECTION SERIAL NUMBER 1	
REFERENCE SHAPE DATA STRING NUMBER=N	
DIRECTION IDENTIFICATION FLAG (FORWARD/BACKWARD)	
BEGINNING REFERENCE NODE Pa	END REFERENCE NODE Pb
DISTANCE DIRECTION QUANTIZED SECTION LENGTH IDENTIFICATION CODE	
TRAFFIC INFORMATION QUANTIZATION TABLE IDENTIFICATION CODE	
ENCODING TABLE IDENTIFICATION CODE	
NO. OF QUANTIZED UNIT SECTIONS	
TRAFFIC INFORMATION AT THE BEGINNING (INITIAL VALUE)	
TRAFFIC INFORMATION ENCODED BY THE DIFFERENCE VALUE FROM STATISTICAL PREDICTION VALUE. INCLUDES THE FOLLOWING INFORMATION: · SECTION LENGTH CHANGE CODE AND SECTION LENGTH AFTER CHANGE · TRAFFIC INFORMATION QUANTIZATION TABLE CHANGE CODE AND TABLE NUMBER AFTER CHANGE · IDENTIFICATION CODE FOR THE POINT CORRESPONDING TO REFERENCE NODE AND CORRESPONDING REFERENCE NODE NUMBER+OFFSET DISTANCE	
§	
TRAFFIC-INFORMATION-PROVIDED SECTION SERIAL NUMBER=W	
§	

FIG. 9

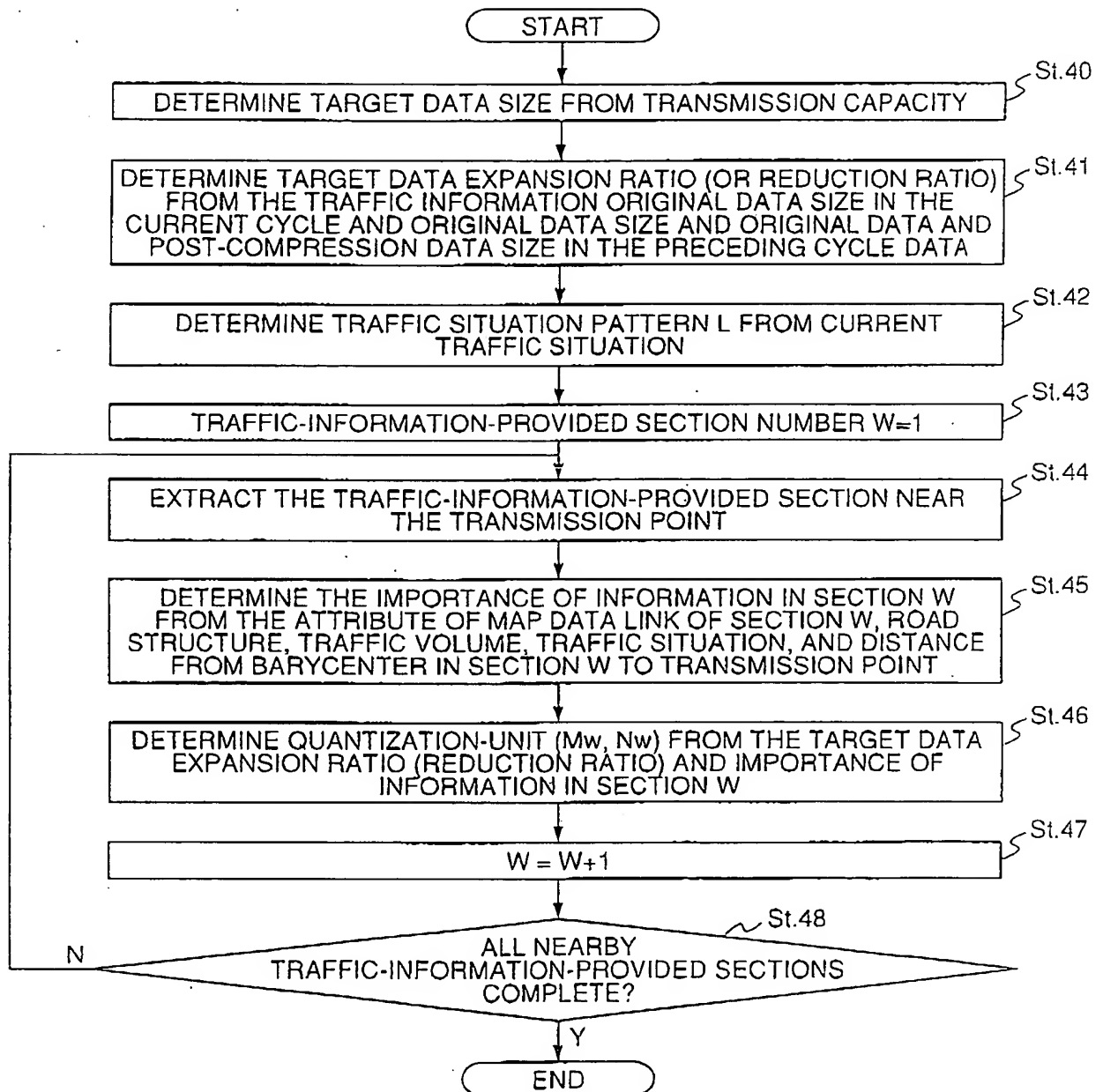


FIG. 10(a)

TARGET DATA EXPANSION RATIO	IMPORTANCE OF INFORMATION A	IMPORTANCE OF INFORMATION B	IMPORTANCE OF INFORMATION C	REMARKS
DEFAULT	RANK 2	RANK 3	RANK 4	—
×2.0 OR ABOVE	+1 RANK	+2 RANK	+3 RANK	DETAILED
×1.6–1.9	±0 RANK	+1 RANK	+2 RANK	↑
×1.1–1.3	±0 RANK	±0 RANK	+1 RANK	↑
×1.0	±0 RANK	±0 RANK	±0 RANK	NOT CHANGED
×0.7–0.9	±0 RANK	±0 RANK	–1 RANK	↓
×0.6–0.5	±0 RANK	–1 RANK	–2 RANK	↓
×0.4 OR BELOW	–1 RANK	–2 RANK	–3 RANK	SIMPLIFIED

FIG. 10(b)

QUANTIZATION-UNIT RANK	DISTANCE DIRECTION QUANTIZATION-UNIT M	TRAFFIC INFORMATION QUANTIZATION TABLE N	DETAIL LEVEL
RANK 1	50m	TABLE 1	DETAILED
RANK 2	100m	TABLE 2	RATHER DETAILED
RANK 3	150m	TABLE 2	STANDARD
RANK 4	200m	TABLE 3	RATHER COARSE
RANK 5	200m	TABLE 4	COARSE

FIG. 11

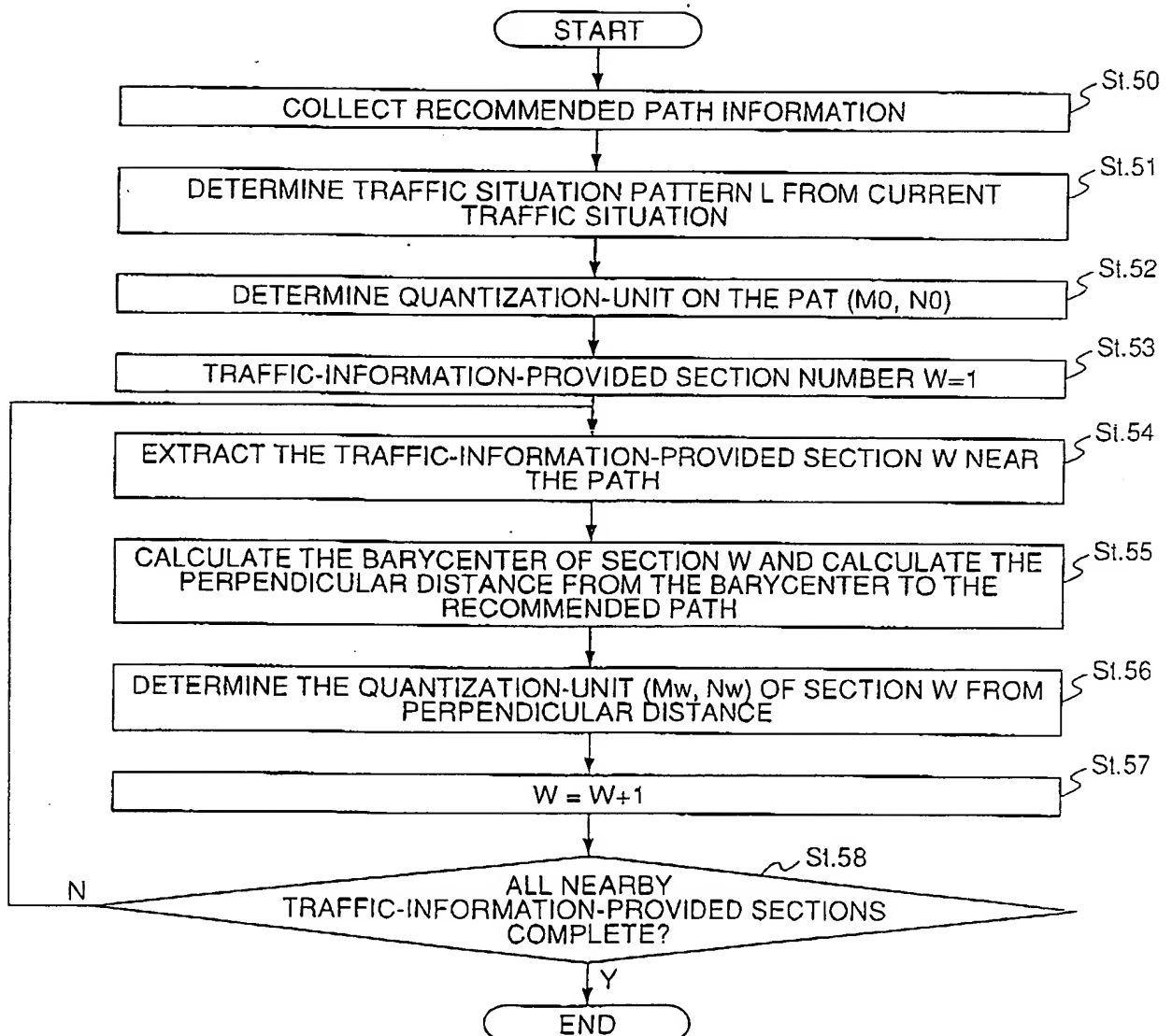


FIG. 12

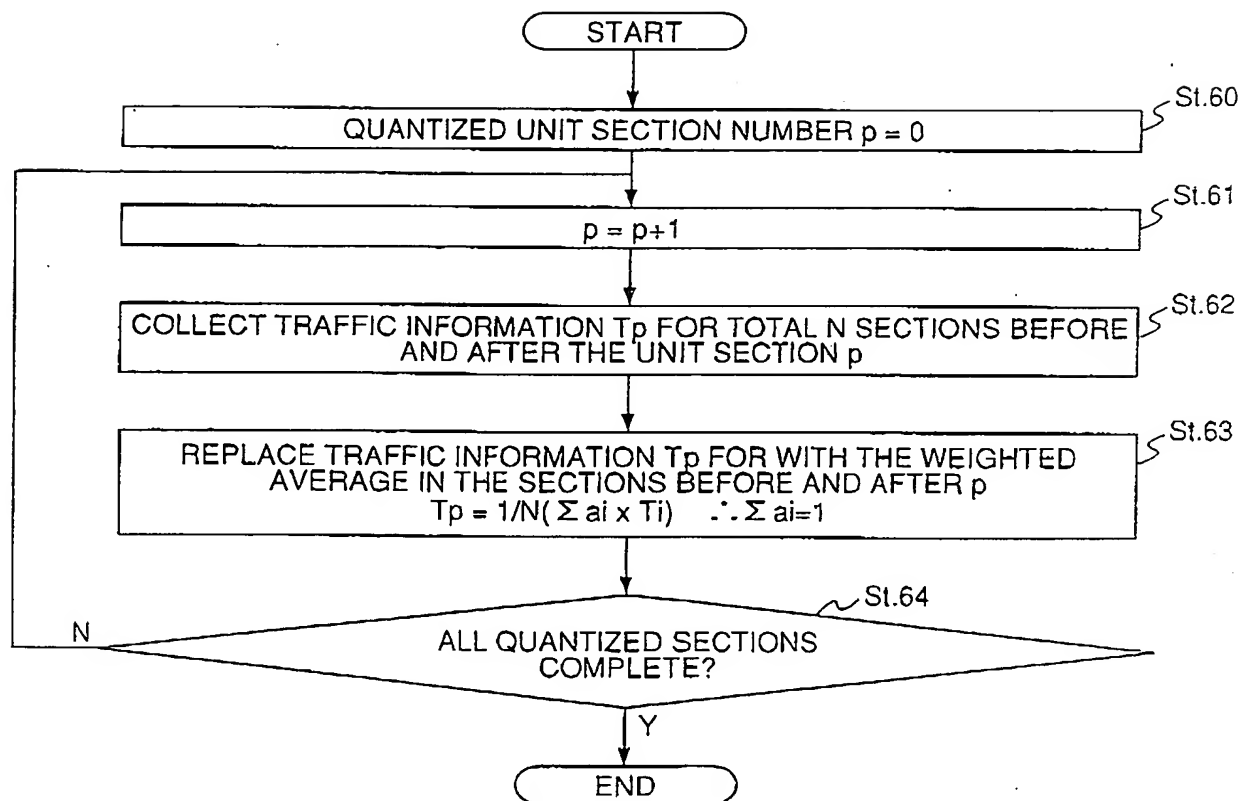


FIG. 13(a)



PEAK (DIFFERENCE FROM TRAFFIC
INFORMATION VOLUME IN THE PRECEDING/SUBSEQUENT
SECTION EXCEEDS THE PRESPECIFIED VALUE)

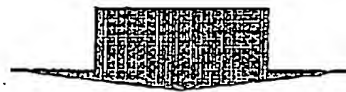


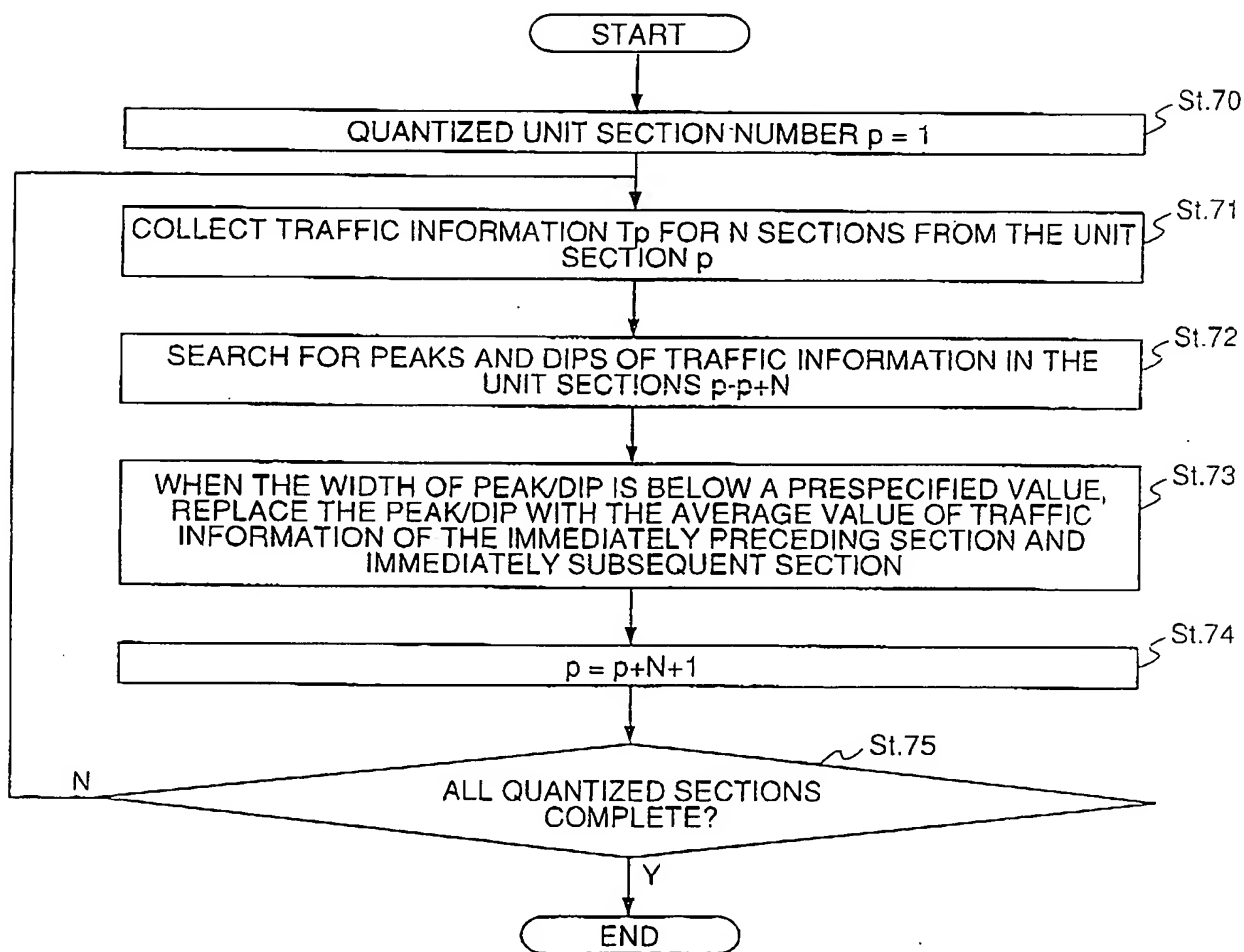
FIG. 13(b)

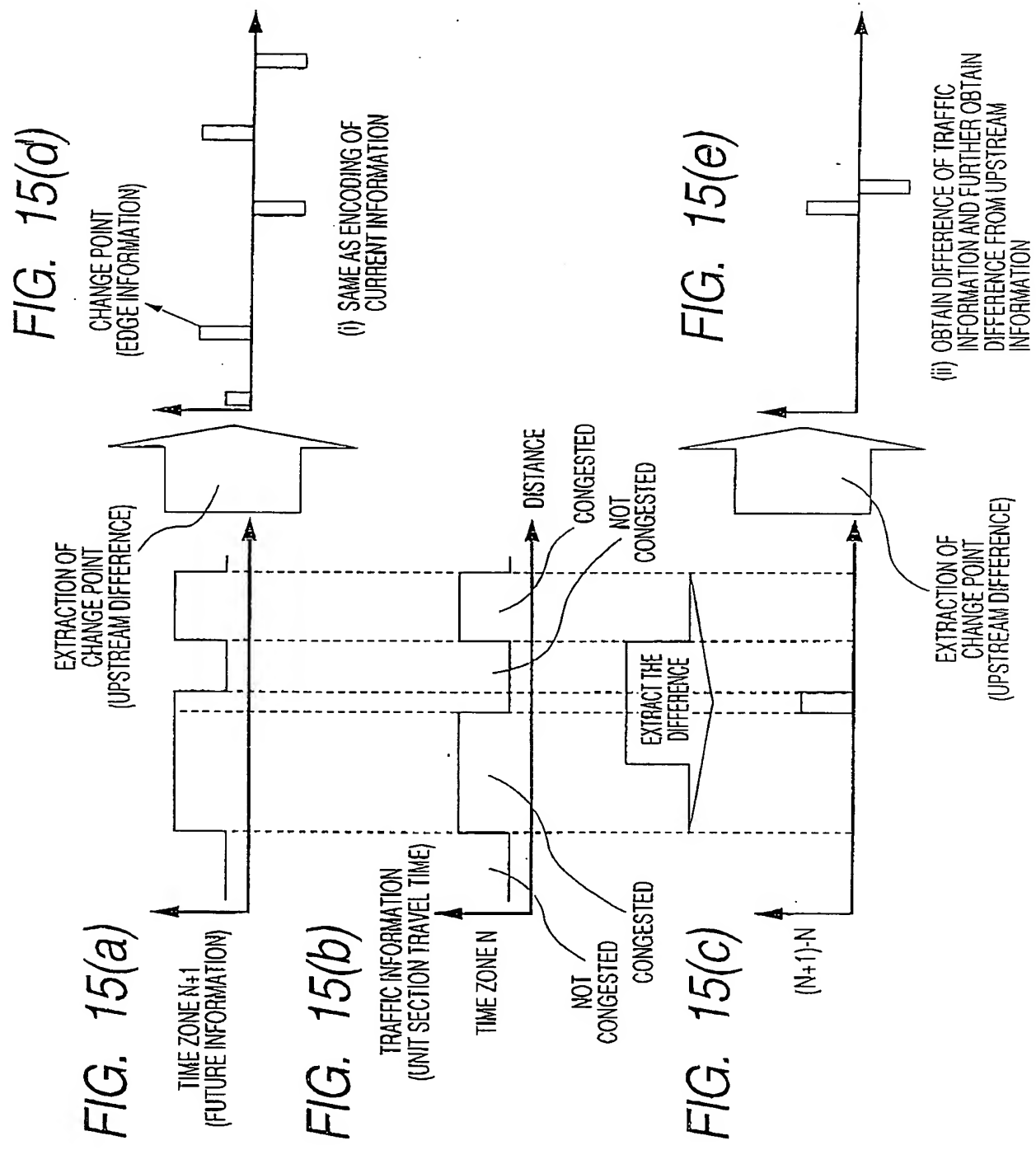


DIP (DIFFERENCE FROM TRAFFIC
INFORMATION VOLUME IN THE PRECEDING/SUBSEQUENT
SECTION EXCEEDS THE PRESPECIFIED VALUE)



FIG. 14





CALCULATION EXAMPLE OF (i)

FIG. 16(a)

1. ORIGINAL TRAFFIC INFORMATION (CURRENT MEASUREMENT VALUE+PREDICTION INFORMATION OF NEXT TIME ZONE)



FIG. 16(b)

2. QUANTIZED REPRESENTATION OF TRAFFIC INFORMATION



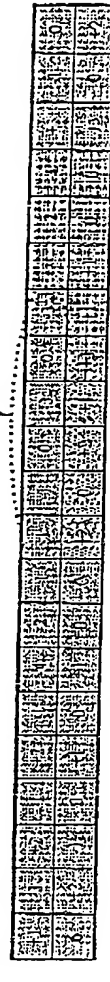
FIG. 16(c)

3. REPRESENT PREDICTION INFORMATION BY THE DIFFERENCE FROM CURRENT INFORMATION (CURRENT INFORMATION IS REPRESENTED BY THE DIFFERENCE FROM AN ADJACENT UNIT SECTION)



FIG. 16(d)

4. REPRESENT PREDICTION INFORMATION BY THE DIFFERENCE FROM AN ADJACENT UNIT SECTION



CONCENTRATES AROUND
 ± 0 FROM CORRELATION LAW C

CONCENTRATES AROUND
 ± 0 FROM CORRELATION LAW B

FIG. 17(a)

SPECIAL CODE		CODE	ADDITIONAL BIT	
SECTION LENGTH CHANGE CODE		101	3 (40/80/160/.../5120m)	
TRAFFIC INFORMATION QUANTIZATION TABLE CHANGE CODE		111110	4 (TABLE NUMBER)	
IDENTIFICATION CODE FOR A POINT CORRESPONDING TO REFERENCE NODE		1100	6 (CORRESPONDING REFERENCE NODE NUMBER) + 8 (OFFSET DISTANCE FROM REFERENCE NODE)	
ENCODING TABLE FOR STATISTICAL PREDICTION DIFFERENCE VALUES OF TRAFFIC INFORMATION		CODE	ADDITIONAL BIT I	ADDITIONAL BIT II (RANGE)
RUN LENGTH	CHANGE VOLUME			
0	0	0	0	-
5	0	100	0	-
10	0	1101	0	-
0	± 1	1110	1 (\pm IDENTIFICATION)	0
0	± 2	111100	1 (\pm IDENTIFICATION)	0
0	± 4	111101	1 (\pm IDENTIFICATION)	1 (3 OR 4)
5				

FIG. 17(b)

SPECIAL CODE		CODE	ADDITIONAL BIT	
NOT				
ENCODING TABLE FOR STATISTICAL PREDICTION DIFFERENCE VALUES OF PREDICTION INFORMATION		CODE	ADDITIONAL BIT I	ADDITIONAL BIT II (RANGE)
RUN LENGTH	CHANGE VOLUME			
0	0	0	0	-
5	0	100	0	-
10	0	1101	0	-
0	±1	1110	1 (±IDENTIFICATION)	0
0	±2	111100	1 (±IDENTIFICATION)	0
0	±4	111101	1 (±IDENTIFICATION)	1 (3 OR 4)
5				

EXAMPLE OF APPARATUS CONFIGURATION
(APPLICATION TO CAR NAVIGATION SYSTEM)

FIG. 18

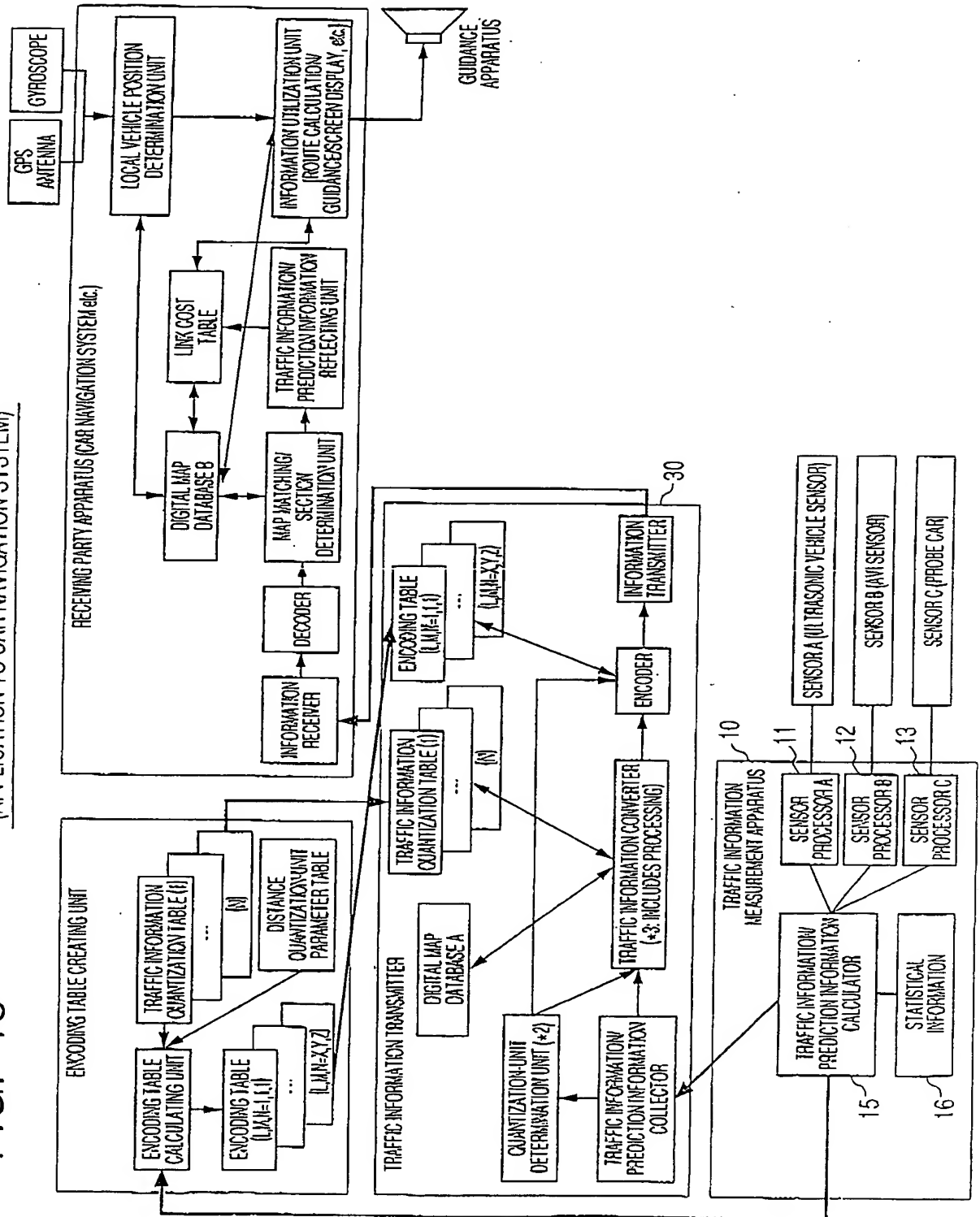


FIG. 19

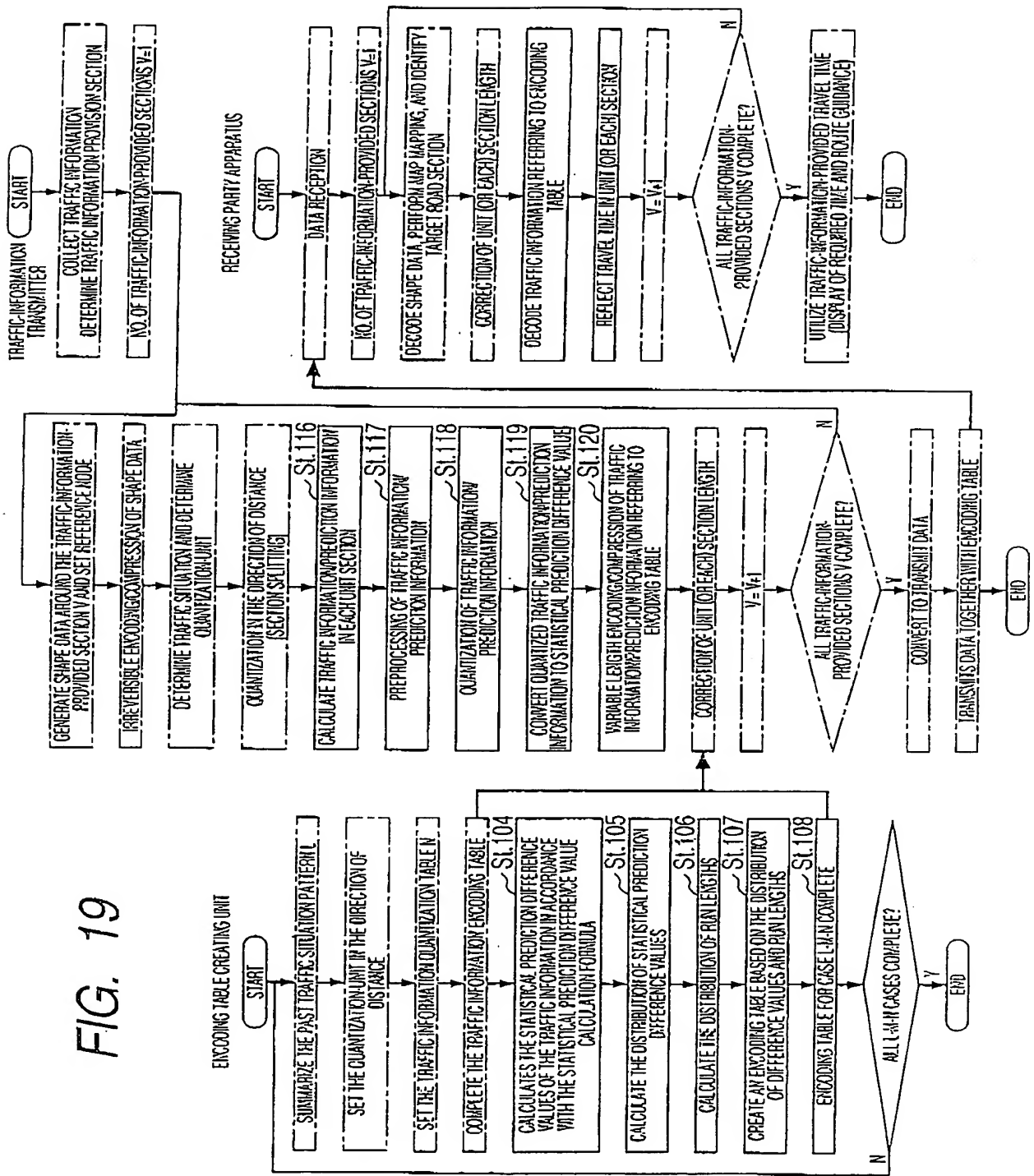


FIG. 20(a)

SHAPE DATA STRING INFORMATION

HEADER INFORMATION	
NO. OF SHAPE DATA N	
SHAPE DATA IDENTIFICATION NUMBER=1	
ENCODING TABLE IDENTIFICATION CODE	
ACCURACY INFORMATION OF MAP DATA AT SHAPE SOURCE	
DIRECTION OF ONE-WAY TRAFFIC (FORWARD/BACKWARD/NONE)	
BEGINNING NODE NUMBER ps	
NODE ps X DIRECTION ABSOLUTE COORDINATE (LONGITUDE)	
NODE ps Y DIRECTION ABSOLUTE COORDINATE (LATITUDE)	
NODE ps ABSOLUTE BEARING	
ps POSITION ERROR (m)	ps BEARING ERROR (°)
MAXIMUM POSITION ERROR OF ENCODED SHAPE DATAT (m)	MAXIMUM BEARING ERROR OF ENCODED SHAPE DATAT (°)
ENCODED SHAPE DATA INCLUDES THE FOLLOWING INFORMATION: · REFERENCE NODE SETTING CODE · SECTION LENGTH CHANGE CODE · EOD CODE	
END NODE NUMBER pe	
NODE pe X DIRECTION RELATIVE COORDINATE (LONGITUDE)	
NODE pe Y DIRECTION RELATIVE COORDINATE (LATITUDE)	
NODE pe ABSOLUTE BEARING	
pe POSITION ERROR (m)	pe BEARING ERROR (°)
§	
SHAPE DATA IDENTIFICATION NUMBER=M	
§	

FIG. 20(b)

TRAFFIC INFORMATION

HEADER INFORMATION	
NO. OF TRAFFIC-INFORMATION-PROVIDED SECTIONS	
TRAFFIC-INFORMATION-PROVIDED SECTION SERIAL NUMBER 1	
REFERENCE SHAPE DATA STRING NUMBER=N	
DIRECTION IDENTIFICATION FLAG (FORWARD/BACKWARD)	
BEGINNING REFERENCE NODE Pa	END REFERENCE NODE Pb
DISTANCE DIRECTION QUANTIZED SECTION LENGTH IDENTIFICATION CODE	
TRAFFIC INFORMATION QUANTIZATION TABLE IDENTIFICATION CODE	
CURRENT INFORMATION: ENCODING TABLE IDENTIFICATION CODE	
PREDICTION INFORMATION: ENCODING TABLE IDENTIFICATION CODE	
NO. OF QUANTIZED UNIT SECTIONS	
NO. OF TIME ZONES OF PREDICTION INFORMATION	
EFFECTIVE TIME OF CURRENT INFORMATION (HH:MM)	
TRAFFIC INFORMATION AT THE BEGINNING (INITIAL VALUE)	
CURRENT TRAFFIC INFORMATION ENCODED USING STATISTICAL PREDICTION DIFFERENCE VALUE FROM AN ADJACENT POINT	
EFFECTIVE TIME OF PREDICTION INFORMATION 1 (HH:MM)	
PREDICTION TRAFFIC INFORMATION ENCODED USING THE DIFFERENCE FROM PRECEDING TIME ZONE AND STATISTICAL PREDICTION DIFFERENCE VALUE FROM AN ADJACENT POINT	
§	
EFFECTIVE TIME OF PREDICTION INFORMATION Q (HH:MM)	
PREDICTION TRAFFIC INFORMATION ENCODED USING THE DIFFERENCE FROM PRECEDING TIME ZONE AND STATISTICAL PREDICTION DIFFERENCE VALUE FROM AN ADJACENT POINT	
TRAFFIC-INFORMATION-PROVIDED SECTION SERIAL NUMBER=2	
§	

FIG. 21(a)

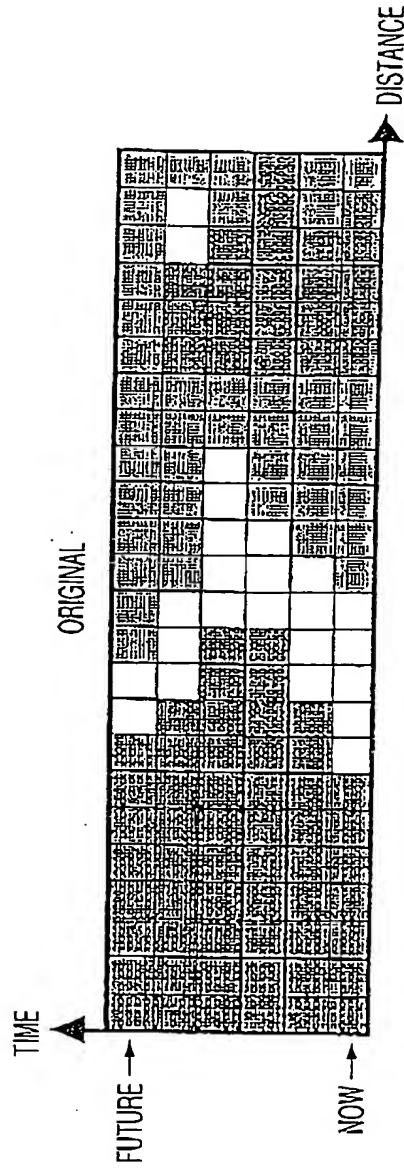


FIG. 21(b)

EX) QUANTIZATION BECOMES COARSER IN ACCORDANCE WITH THE FUTURE TIME (POSITION NO. OF STATES)

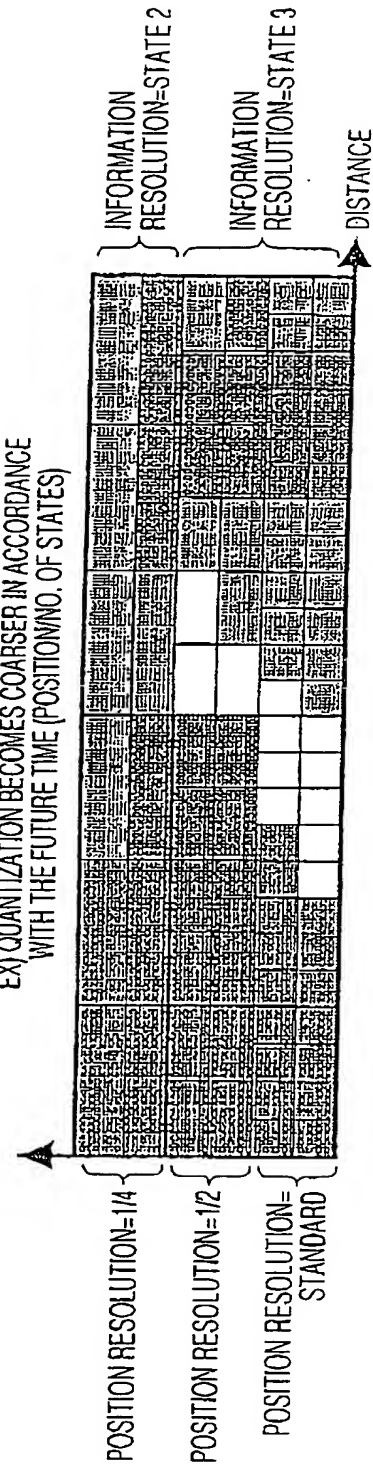


FIG. 22(a)

0. ORIGINAL TRAFFIC INFORMATION (CURRENT MEASUREMENT
VALUE+PREDICTION INFORMATION IN THE NEXT TIME ZONE)

PREDICTION INFORMATION IN THE NEXT
TIME ZONE (PREDICTION 1) →
CURRENT INFORMATION (NOW) →

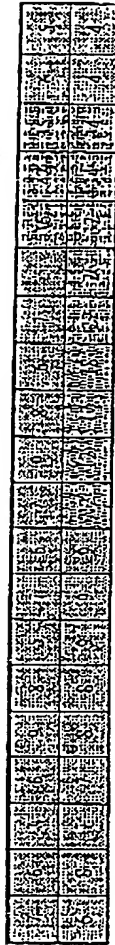


FIG. 22(b)

1. REDUCE THE POSITION RESOLUTION TO HALF
(AVERAGE THE TRAFFIC INFORMATION AND
ROUND UP THE FRACTIONAL PORTION)

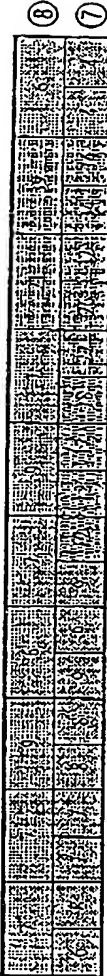


FIG. 22(c)

2. PERFORM QUANTIZATION BY USING
A DETAILED QUANTIZATION TABLE



FIG. 22(d)

3. PERFORM QUANTIZATION BY USING
A COARSE QUANTIZATION TABLE



FIG. 22(e)

4. EXTRACT THE DIFFERENCE IN THE
DIRECTION OF TIME BY USING A
COARSE QUANTIZATION TABLE



FIG. 22(f)

5. EXTRACT THE DIFFERENCE FROM
UPSTREAM BY USING RESPECTIVE
QUANTIZATION TABLES



FIG. 23

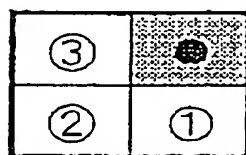
TRAFFIC INFORMATION QUANTIZATION TABLE
(SPEED QUANTIZATION TABLE)

SPEED (km/h)	QUANTIZED VOLUME (CURRENT)	QUANTIZED VOLUME (PREDICTION 1)	QUANTIZED VOLUME (PREDICTION 2)
0	0	0	0
1	1	1	1
2	2		
3	3		
4	4	2	
5	5	3	2
6	6		
7	7	4	
8	8		
9	9	5	3
10~11	10		
12~13	11		
14~15	12	6	
16~17	13	7	4
18~19	14		
20~24	15	8	
25~29	16		
30~34	17	9	5
35~39	18		
40~44	19	10	
45~49	20		
50~59	21	11	6
60~69	22		
70~79	23	12	
80~99	24		
{			
200 OR MORE	30	15	8 (180km/h OR MORE)

FIG. 24

TRAFFIC INFORMATION

HEADER INFORMATION	
NO. OF TRAFFIC-INFORMATION-PROVIDED SECTIONS	
TRAFFIC-INFORMATION-PROVIDED SECTION SERIAL NUMBER 1	
REFERENCE SHAPE DATA STRING NUMBER=N	
DIRECTION IDENTIFICATION FLAG (FORWARD/BACKWARD)	
BEGINNING REFERENCE NODE Pa	END REFERENCE NODE Pb
DISTANCE DIRECTION QUANTIZED SECTION LENGTH IDENTIFICATION CODE	
TRAFFIC INFORMATION QUANTIZATION TABLE IDENTIFICATION CODE	
CURRENT INFORMATION: ENCODING TABLE IDENTIFICATION CODE	
PREDICTION INFORMATION: ENCODING TABLE IDENTIFICATION CODE	
NO. OF QUANTIZED UNIT SECTIONS	
NO. OF TIME ZONES OF PREDICTION INFORMATION	
EFFECTIVE TIME OF CURRENT INFORMATION (HH:MM)	
TRAFFIC INFORMATION AT THE BEGINNING (INITIAL VALUE)	
CURRENT TRAFFIC INFORMATION ENCODED BY THE DIFFERENCE VALUE FROM STATISTICAL PREDICTION VALUE	
EFFECTIVE TIME OF PREDICTION INFORMATION 1 (HH:MM)	
POSITION RESOLUTION IDENTIFICATION CODE	QUANTIZATION TABLE NUMBER
PREDICTION TRAFFIC INFORMATION ENCODED BY THE DIFFERENCE VALUE FROM STATISTICAL PREDICTION VALUE	
§	
EFFECTIVE TIME OF PREDICTION INFORMATION Q (HH:MM)	
POSITION RESOLUTION IDENTIFICATION CODE	QUANTIZATION TABLE NUMBER
PREDICTION TRAFFIC INFORMATION ENCODED BY THE DIFFERENCE VALUE FROM STATISTICAL PREDICTION VALUE	
TRAFFIC-INFORMATION-PROVIDED SECTION SERIAL NUMBER=2	
§	

FIG. 25

STATISTICAL PREDICTION VALUE OF ● = a ① + b ② + c ③ (WHERE $a+b+c=1$)

$$\text{OR} = (\text{①} + \text{③}) \div 2$$

FIG. 26

① ORIGINAL TRAFFIC INFORMATION DATA			② FFT PROCESSING ON THE TRANSMITTER (ENCODER)			③ QUANTIZATION TABLE			④ TRANSMIT DATA			⑤ INVERSE FFT PROCESSING ON THE RECEIVER (DECODER)			⑥ REPRODUCED TRAFFIC INFORMATION DATA			⑦ DIFFERENCE BETWEEN ORIGINAL DATA AND REPRODUCED DATA		
SPEED INFORMATION	CONGESTION INFORMATION		MAGNITUDE REPRESENTATION OF ORIGINAL DATA	FFT COEFFICIENT AFTER FFT		FFT REAL PART QUANTIZATION COEFFICIENT	FFT IMAGINARY PART QUANTIZATION COEFFICIENT		FFT REAL PART QUANTIZATION COEFFICIENT	FFT IMAGINARY PART QUANTIZATION COEFFICIENT		MAGNITUDE REPRESENTATION OF RECEIVED DATA	INVERSE FFT COEFFICIENT AFTER INVERSE FFT		SPEED INFORMATION	CONGESTION INFORMATION		SPEED INFORMATION	CONGESTION INFORMATION	
6	10		6+10i	723+710i		183	178					732+712i	575+7635i		6	8		0	-2	
8	10		8+10i	-14852120918502+2721458689737i		-37	68					-1491272i	530527354920287+853067265321677i		6	9		-2	-1	
7	10		7+10i	-181863123223659+13734331543237i		-45	34					-1804136i	623426637701197+103005635357910i		6	11		-1	-1	
7	10		7+10i	-554713983314711-53468277168923i		-14	-13					-56-52i	198101297876708+937953794127272i		5	9		-2	-1	
8	10		8+10i	28394123466544+1202353674416i		7	32					28+120i	651223230910017+95922230070396i		7	10		-1	0	
8	10		8+10i	-14511811985375+095171618333725i		-36	0					-144	64763544638239+102678775231286i		6	10		-2	0	
9	10		9+10i	0190731936517893-1552787879430i		0	-2					-16i	5471278981631+1370897252652i		5	12		-4	2	
9	10		9+10i	-405017001665513+429151819467876i		-5	5					-40+40i	33030378893502+135436469478559i		10	14		1	4	
9	10		9+10i	-43-189399999999999i		-5	0					-40	1023111373i		10	11		1	1	
12	20		12+20i	-568871935653916-203048233317568i		-7	-3					-56-24i	123432739735899+20980722500786i		12	20		0	0	
12	20		12+20i	-143974741515465-838147272871013i		-2	-1					-16-8	12185497555221844394771475i		13	22		0	2	
17	20		17+20i	-383513307293333+330246339471074i		-5	1					-40-2	184482141856231+17859182300074i		18	18		1	-2	
18	20		18+20i	-82233987444162-3134314375030931i		-1	-3					-16-48i	174362915201035+183183949220106i		17	19		-1	-1	
22	20		22+20i	-40710032729321+24372718468335i		-1	2					-18-32i	18489765012166+2437272359810847i		18	20		-4	0	
26	20		26+20i	-54536417710755-8880254836202i		-3	-1					-40-16i	2539898574648+21247459001796i		26	21		0	1	
32	20		32+20i	672547474221385-316849387667821i		0	-2					-32i	309783456973565+203626867300298i		31	21		-1	1	
34	20		34+20i	-19-10i		-1	-1					-16-16i	34223235i		34	22		0	2	
34	20		34+20i	-23929545766037-19473231338786i		-1	0					-16	354245017307487+215758249091537i		35	22		1	2	
4	10		4+10i	-27131656042174-35603200976582i		-1	-1					-32-32i	3111609296619+97358609468866i		4	10		0	0	
4	10		4+10i	19541094265385-1987333398347i		1	-1					32-32i	53946498433584+1233609644211i		6	13		2	3	
6	10		6+10i	-403411254669543-42233987441614i		-1	0					-32	537876592986+110051776652866i		7	10		1	0	
7	10		7+10i	386749585961286-30423875853891i		0	-2					-64	83743141613155+12342351371640i		9	13		2	3	
41	40		41+40i	1392861152281426+1152153945066i		0	1					32i	4071676737214387596653469211i		44	33		3	-1	
45	40		45+40i	-45996803355987-2535993071615i		-1	-1					-32-32i	4246862335459492039017103957i		48	33		2	-1	
46	40		46+40i	-300000000000000-58i		0	-2					-64	48738625i		48	33		2	-1	
39	40		39+40i	521142338298211-793782354717105i		0	-1					-32i	37342329737434371731967413747i		38	37		0	-3	
43	40		43+40i	558242351756119-25413569583756i		0	0					0	42310543631744138381317191725i		42	38		-1	-2	
64	40		64+40i	-407891513702155-119916701293958i		-1	-2					-64-128i	424292703373508385778103051038i		62	40		-2	0	
61	40		61+40i	11523595674416-626588542484925i		2	-1					128-64i	40058170849884743273160171719927i		62	40		0	0	
65	40		65+40i	-31279312733707+198356857239245i		-1	0					-64	43907066451838+403733800290564i		46	41		1	-1	
65	40		65+40i	141232924585368-755724903628911i		2	-4					128-256i	48342467923984319218115822364i		48	33		0	-2	
43	40		43+40i	212422222009168-163564022106318i		3	-3					132-192i	433716532056377388904210505011i		43	33		0	-1	

FIG. 27

① ORIGINAL TRAFFIC INFORMATION DATA			② FFT PROCESSING ON THE TRANSMITTER (ENCODER)			③ TRANSMIT DATA			⑤ INVERSE FFT PROCESSING ON THE RECEIVER (DECODER)			⑥ REPRODUCED TRAFFIC INFORMATION DATA			⑦ DIFFERENCE BETWEEN ORIGINAL DATA AND REPRODUCED DATA		
SPEED INFORMATION	CONGESTION INFORMATION		MAGNITUDE REPRESENTATION OF ORIGINAL DATA	FFT COEFFICIENT AFTER FFT		QUANTIZATION TABLE	FFT PART QUANTIZATION COEFFICIENT	FFT PART QUANTIZATION COEFFICIENT	MAGNITUDE REPRESENTATION OF RECEIVED DATA	INVERSE FFT COEFFICIENT AFTER INVERSE FFT		SPEED INFORMATION	CONGESTION INFORMATION		SPEED INFORMATION	CONGESTION INFORMATION	
6	10		5+10i	123+710i		1	733	710	133+710i	6.125+3.0625i		6	10		0	0	
8	10		8+10i	-148.6217180138607+77.74559897791i		1	-149	273	-149+273i	7.839496530734193+9.1404268840811i		8	10		0	0	
7	10		7+10i	-181.663253726899+137.240315597207i		1	-182	137	-182+137i	7.6190180039866+10.217853874i		7	10		0	0	
8	10		8+10i	-55.47131825314211-53.4494271688831i		1	-55	-53	-55-53i	7.2183127918787+10.596277120731i		7	11		0	1	
8	10		8+10i	25.941125496895+1120.225396744616i		1	27	120	27+120i	8.20532715000735+9.98169417382451i		8	10		0	0	
8	10		8+10i	-145.180119833325+0.96171618333325i		1	-145	1	-145+1i	8.16589211895886+9.789207675336225i		8	10		0	0	
9	10		9+10i	9.1907191517859-15.5228287819435i		1	0	-16	-16i	8.75927005357071+9.93519465152465i		9	10		0	0	
9	10		9+10i	-40.9017001665513+0.93151819467876i		1	-41	43	-41+43i	9.26653308724902+10.39394347877196i		9	10		0	0	
9	10		9+10i	-43-1.99999999999999i		2	-22	-1	-22-1i	9.471502000000001+10.001251i		9	10		0	0	
12	20		12+20i	-54.889993548916-20.0402355175081i		2	-27	-10	-27-10i	12.3183026230054+18.611374881206i		12	20		0	0	
12	20		12+20i	-14.567474151545-8.38197222710131i		2	-7	-4	-7-4i	11.1949947428135+19.6388010371638i		12	20		0	0	
17	20		17+20i	-29.7512407935533+5.30246329471047i		2	-20	3	-20+3i	11.0966118036357+19.76689185662i		17	20		0	0	
18	20		18+20i	-8.223558744162-32.3401457805075i		2	-5	-26	-5-26i	11.87601230136+19.7653748897091i		18	20		0	0	
22	20		22+20i	-10.7109130239521+24.6727184655351i		2	-5	12	-5+12i	12.7424829603489+19.8078216542195i		22	20		0	0	
26	20		26+20i	-54.8584177140756-9.8800254818204i		2	-27	-5	-27-5i	13.88167234921883+19.2785860749736i		26	19		0	0	
32	20		32+20i	5.72547474221985-31.684856766283i		2	3	-16	3-16i	11.381689248673+19.744220428985i		31	20		-1	0	
34	20		34+20i	-19-10i		4	-5	-3	-5-3i	11.375728101251i		37	20		-1	0	
34	20		34+20i	-23.988546768037-1.92478231338765i		4	-5	0	-5i	12.859200656747+20.2141116879971i		34	20		0	0	
4+10i			4+10i	-27.131656042174-25.5037000700891i		4	-7	-9	-7-9i	13.0228708309159+10.68089132006i		4	10		0	0	
4+10i			4+10i	19.5410942853095-19.87724398547i		4	5	-5	5-5i	12.011504284684+10.3218714515786i		4	11		0	1	
6+10i			6+10i	-40.3111254988543-4.225389674116147i		4	-10	-1	-10-1i	13.3511723405866+9.9310687817582i		6	10		0	0	
7+10i			7+10i	3.8534668361286-30.43191655589i		4	1	-13	1-13i	12.556818415876+9.3387863285551i		7	10		0	0	
41+40i			41+40i	7.878811527884+26.1152163940561i		4	2	7	2+7i	14.0878298082874+39.658388463457i		41	40		0	0	
45+40i			45+40i	-65.986001955981-25.2650007164151i		4	-11	-9	-11-9i	15.1408499494616+140.7463517125746i		45	40		0	0	
46+40i			46+40i	-2.00000000000000-36i		8	0	-7	0-7i	15.8125+40.03125i		46	40		0	0	
33+40i			33+40i	5.91142850798211-29.2789361377705i		8	1	-4	1-4i	17.986074865002+40.0400783189936i		46	40		0	0	
43+40i			43+40i	2.59742151136113+2.6415668852936i		8	0	0	0	17.986074865002+40.0400783189936i		43	40		0	0	
44+40i			44+40i	-40.7631513242156-119.8767670128686i		8	-5	-15	-5-15i	12.8132863+33.422+140.58494672323i		43	40		0	0	
40+40i			40+40i	115.223356744416-63.1568642494925i		8	14	-8	14-8i	13.7032333972002+40.194705993465i		44	40		0	0	
45+40i			45+40i	-51.7272012723207+13.6348372233345i		8	-11	2	-11+2i	117-84i		40	40		0	0	
49+40i			49+40i	147.282824583598-255.724003678981i		8	18	-32	18-32i	15.24665654078+40.1852038103321i		45	40		0	0	
43+40i			43+40i	212.628222099768-163.9464222186918i		8	27	-20	27-20i	144-256i		49	40		0	0	
										148.080353718072+39.876078819535i		48	40		0	0	
										143.1418234739232+40.1243383749605i		43	40		0	0	

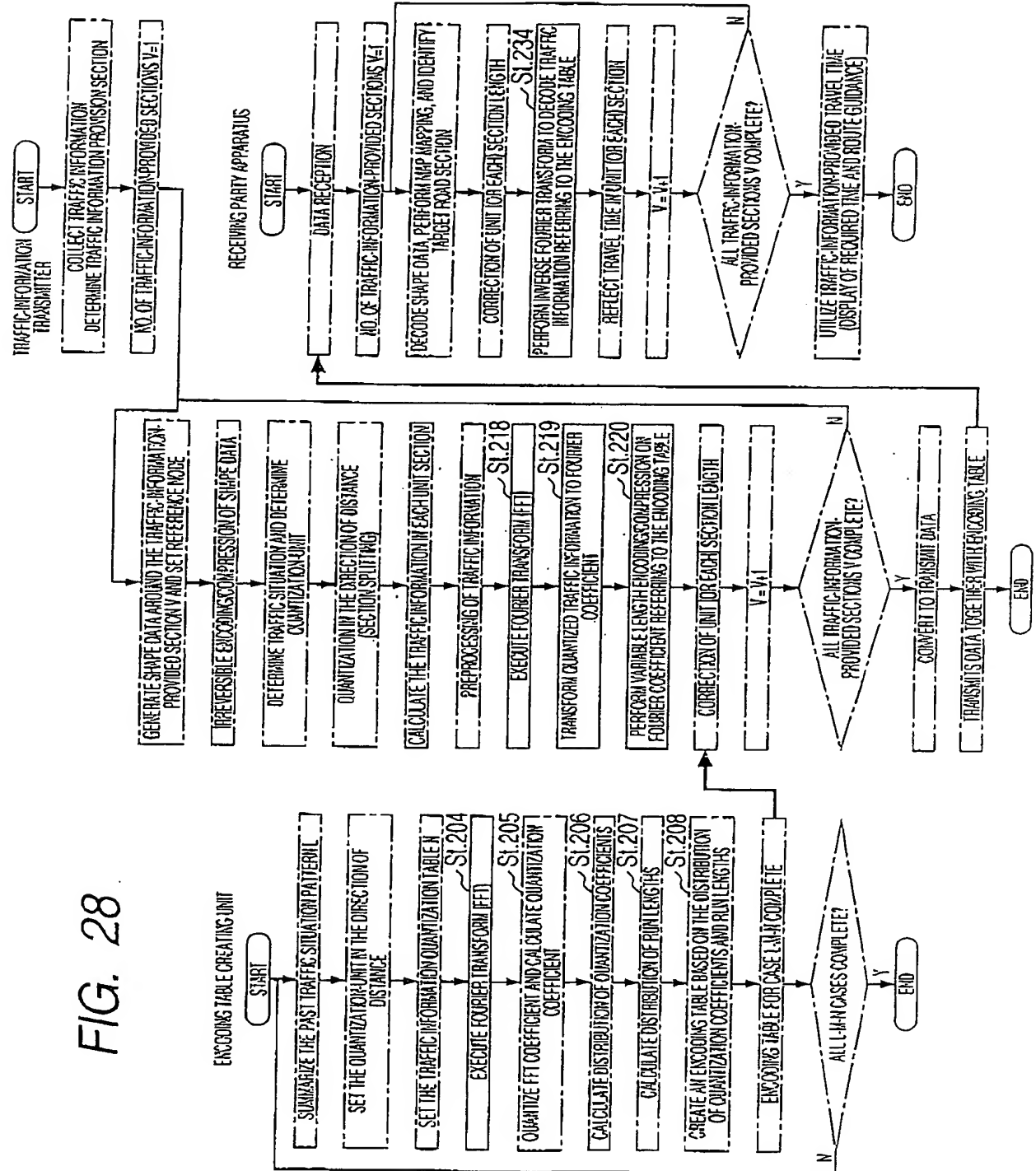


FIG. 29

EXAMPLE OF TRAFFIC INFORMATION IN FFT REPRESENTATION

HEADER INFORMATION	
NO. OF TRAFFIC-INFORMATION-PROVIDED SECTIONS	
TRAFFIC-INFORMATION-PROVIDED SECTION SERIAL NUMBER 1	
REFERENCE SHAPE DATA STRING NUMBER=N	
DIRECTION IDENTIFICATION FLAG (FORWARD/BACKWARD)	
BEGINNING REFERENCE NODE Pa	END REFERENCE NODE Pb
TRAFFIC INFORMATION QUANTIZATION TABLE IDENTIFICATION CODE	
ENCODING TABLE IDENTIFICATION CODE	
AMOUNT OF SECTION SPLITTING BETWEEN REFERENCE NODES 2^N	
DATA STRING WHERE FOURIER COEFFICIENTS ARE VARIABLE LENGTH ENCODED IN THE ORDER OF REAL PART TO IMAGINARY PART, AND LOW FREQUENCIES TO HIGH FREQUENCIES	
S	
TRAFFIC-INFORMATION-PROVIDED SECTION SERIAL NUMBER=W	
S	

FIG. 30

EXAMPLE OF ENCODING TABLE OF FFT COEFFICIENTS

SPECIAL CODE		CODE	ADDITIONAL BIT	
EOD CODE		1100	NOT	
ENCODING TABLE		CODE	ADDITIONAL BIT I	ADDITIONAL BIT II (RANGE)
RUN LENGTH	FFT COEFFICIENTS			
0	0	0	0	-
5	0	100	0	-
10	0	1101	0	-
0	± 1	1110	1 (\pm IDENTIFICATION)	0
0	± 2	111100	1 (\pm IDENTIFICATION)	0
0	$\pm 3-6$	111101	1 (\pm IDENTIFICATION)	2 (3/4/5/6 IDENTIFICATION)

FIG. 31(a)

EXAMPLE OF TRAFFIC INFORMATION IN FFT REPRESENTATION 2
(LOW FREQUENCY COMPONENT/HIGH FREQUENCY COMPONENT SPLIT TYPE)

HEADER INFORMATION	
NO. OF THIS INFORMATION	AMOUNT OF TRAFFIC INFORMATION SPLITTING
NO. OF TRAFFIC-INFORMATION-PROVIDED SECTIONS	
TRAFFIC-INFORMATION-PROVIDED SECTION SERIAL NUMBER 1	
REFERENCE SHAPE DATA STRING NUMBER=N	
DIRECTION IDENTIFICATION FLAG (FORWARD/BACKWARD)	
BEGINNING REFERENCE NODE Pa	END REFERENCE NODE Pb
TRAFFIC INFORMATION QUANTIZATION TABLE IDENTIFICATION CODE	
ENCODING TABLE IDENTIFICATION CODE	
AMOUNT OF SECTION SPLITTING BETWEEN REFERENCE NODE 2^N	
DATA STRING WHERE FOURIER COEFFICIENTS ARE VARIABLE LENGTH ENCODED IN THE ORDER OF REAL PART TO IMAGINARY PART, COEFFICIENTS OF BASE FUNCTION TO HIGHT FREQUENCIES	
§	
TRAFFIC-INFORMATION-PROVIDED SECTION SERIAL NUMBER=W	
§	

BASIC INFORMATION & INFORMATION ON FFT COEFFICIENTS
OF LOW FREQUENCY COMPONENT

FIG. 31(b)

HEADER INFORMATION	
NO. OF THIS INFORMATION ※	AMOUNT OF TRAFFIC INFORMATION SPLITTING ※
TRAFFIC-INFORMATION-PROVIDED SECTION SERIAL NUMBER 1	
DATA STRING WHERE FOURIER COEFFICIENTS ARE VARIABLE LENGTH ENCODED IN THE ORDER OF REAL PART TO IMAGINARY PART, COEFFICIENTS OF BASE FUNCTION TO HIGHT FREQUENCIES	
§	
TRAFFIC-INFORMATION-PROVIDED SECTION SERIAL NUMBER=W	
§	

INFORMATION ON FFT COEFFICIENTS
OF HIGH FREQUENCY COMPONENT
(PART OF SUBSECTIONS)

FIG. 32(a)

ORDINARY DATA TRANSMISSION ORDER

(DATA IS SEQUENTIALLY TRANSMITTED IN THE ORDER TO LOW FREQUENCY COMPONENTS TO HIGH FREQUENCY COMPONENTS IN ASCENDING ORDER OF SECTION NUMBER)

INFORMATION (FFT COEFFICIENT) IN SECTION NO. 1		INFORMATION (FFT COEFFICIENT) IN SECTION NO. 2		INFORMATION (FFT COEFFICIENT) IN SECTION NO. 3	
REAL PART	IMAGINARY PART	REAL PART	IMAGINARY PART	REAL PART	IMAGINARY PART
45	64	-13	87	53	16
34	-22	8	-32	-89	45
25	-7	5	27	14	-22
0	6	-4	-4	0	19
-2	0	0	3	0	-21
-14	0	0	0	0	-6
3	-4	0	-9	0	0
0	0	0	0	-5	-3
0	1	0	6	9	0
0	12	0	8	8	0
-2	-5	4	12	4	6
0	0	0	0	0	-12
-1	0	2	0	3	0
3	1	-4	3	5	-3
-2	-7	0	-2	0	0
0	0	0	-1	1	4
0	0	0	7	-3	0
0	0	3	0	-2	1
-6	0	0	0	0	0
3	6	6	0	0	0
4	0	0	4	0	0
1	0	-2	-1	0	-2

FIG. 32(b)

DATA TRANSMISSION ORDER ACCORDING TO THIS SYSTEM
(LOW FREQUENCY COMPONENTS IN ALL SECTIONS ARE TRANSMITTED, THEN HIGH FREQUENCY COMPONENTS ARE SEQUENTIALLY TRANSMITTED)

INFORMATION (FFT COEFFICIENT) IN SECTION NO. 1		INFORMATION (FFT COEFFICIENT) IN SECTION NO. 2		INFORMATION (FFT COEFFICIENT) IN SECTION NO. 3	
REAL PART	IMAGINARY PART	REAL PART	IMAGINARY PART	REAL PART	IMAGINARY PART
45	64	-13	87	53	16
34	-22	8	-32	-89	45
25	-7	5	27	14	-22
0	6	-4	-4	0	19
-2	0	0	3	0	-21
-14	0	0	0	0	-6
3	-4	0	-9	0	0
0	0	0	0	-5	-3
0	1	0	6	9	0
0	12	0	8	8	0
-2	-5	4	12	4	6
0	0	0	0	0	-12
-1	0	2	0	3	0
3	1	-4	3	5	-3
-2	-7	0	-2	0	0
0	0	0	-1	1	4
0	0	0	7	-3	0
0	0	3	0	-2	1
-6	0	0	0	0	0
3	6	6	0	0	0
4	0	0	4	0	0
1	0	-2	-1	0	-2

FIG. 33

EXAMPLE OF APPARATUS CONFIGURATION

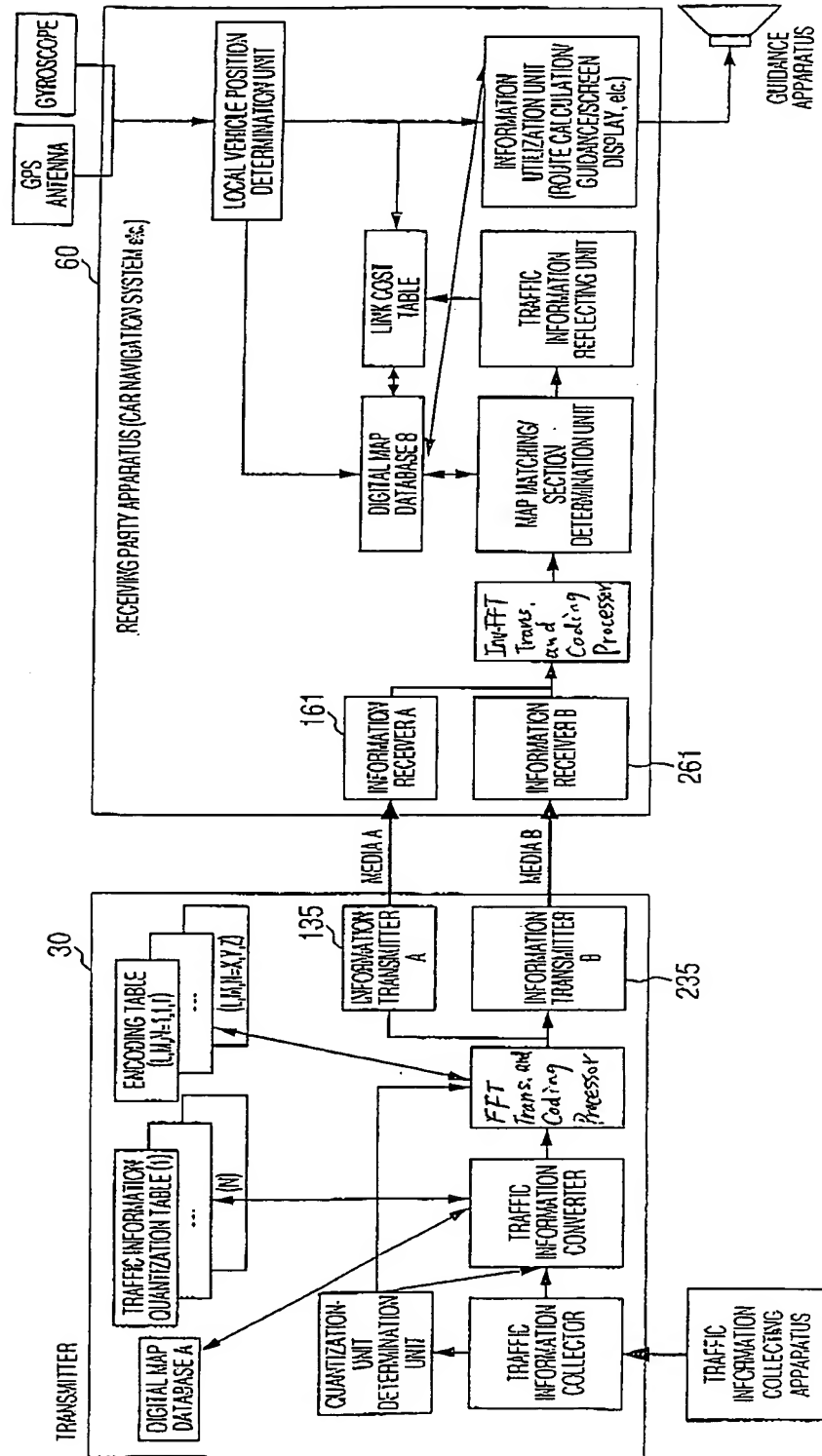


FIG. 34(a)

ORIGINAL INFORMATION

HEADER INFORMATION	
NO. OF THIS INFORMATION	AMOUNT OF TRAFFIC INFORMATION SPLITTING
NO. OF TRAFFIC-INFORMATION-PROVIDED SECTIONS	
TRAFFIC-INFORMATION-PROVIDED SECTION SERIAL NUMBER 1	
REFERENCE SHAPE DATA STRING NUMBER=N	
DIRECTION IDENTIFICATION FLAG (FORWARD/BACKWARD)	
BEGINNING REFERENCE NODE Pa	END REFERENCE NODE Pb
DISTANCE DIRECTION QUANTIZED SECTION LENGTH IDENTIFICATION CODE	
TRAFFIC INFORMATION QUANTIZATION TABLE IDENTIFICATION CODE	
CURRENT INFORMATION: ENCODING TABLE IDENTIFICATION CODE	
PREDICTION INFORMATION: ENCODING TABLE IDENTIFICATION CODE	
NO. OF QUANTIZED UNIT SECTIONS	
NO. OF TIME ZONES OF PREDICTION INFORMATION	
EFFECTIVE TIME OF CURRENT INFORMATION (HH:MM)	
TRAFFIC INFORMATION AT THE BEGINNING (INITIAL VALUE)	
CURRENT TRAFFIC INFORMATION ENCODED USING THE STATISTICAL PREDICTION DIFFERENCE VALUE FROM AN ADJACENT POINT	
TRAFFIC-INFORMATION-PROVIDED SECTION SERIAL NUMBER=2	
§	

FIG. 34(b)

DIFFERENCE INFORMATION FROM PRECEDING TIME ZONE

HEADER INFORMATION	
NO. OF THIS INFORMATION	AMOUNT OF TRAFFIC INFORMATION SPLITTING
TRAFFIC-INFORMATION-PROVIDED SECTION SERIAL NUMBER 1	
ENCODING TABLE IDENTIFICATION CODE	
EFFECTIVE TIME OF PREDICTION INFORMATION Q (HH:MM)	
CURRENT TRAFFIC INFORMATION ENCODED USING THE DIFFERENCE FROM PRECEDING TIME ZONE AND STATISTICAL PREDICTION DIFFERENCE VALUE FROM AN ADJACENT POINT	
TRAFFIC-INFORMATION-PROVIDED SECTION SERIAL NUMBER=2	
§	

FIG. 35

EXAMPLE OF APPARATUS CONFIGURATION
(APPLICATION TO PC OR OPERATION SYSTEM)

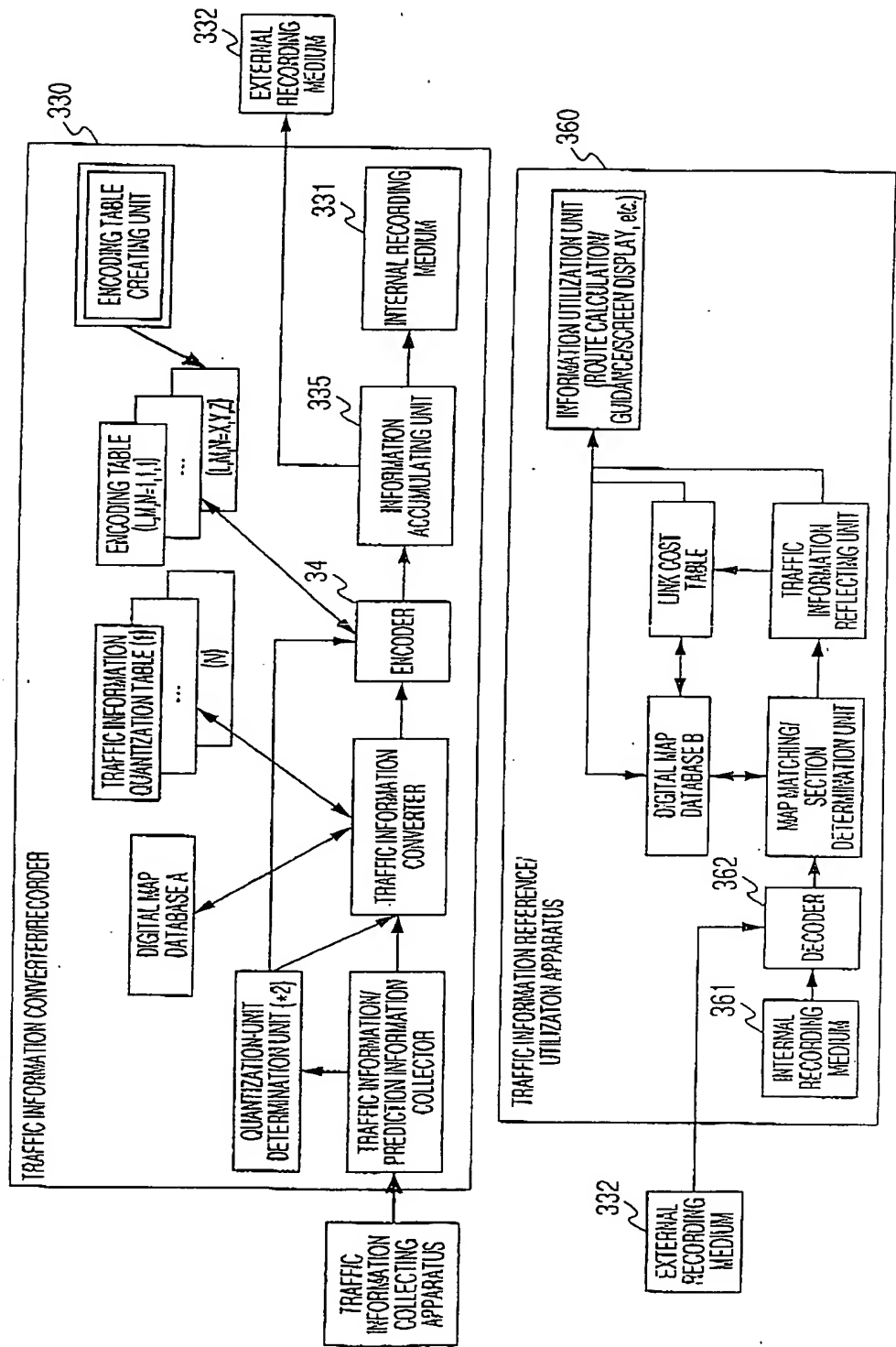


FIG. 36

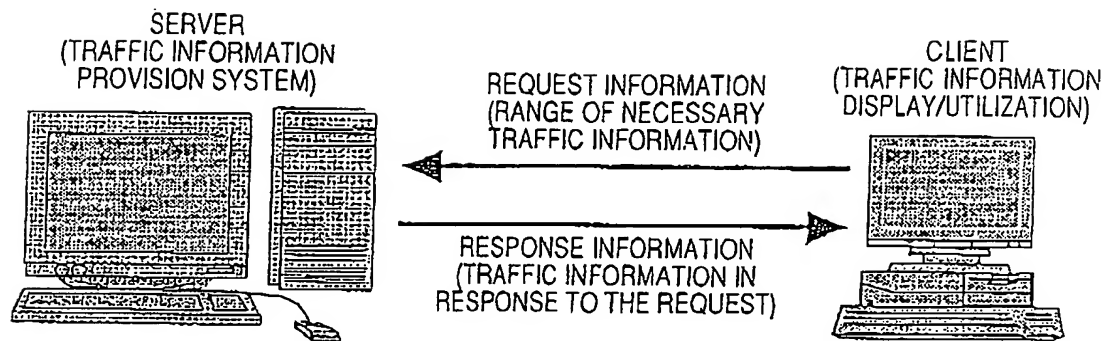


FIG. 37

INFORMATION TRANSMITTED FROM CLIENT
TO SERVER <REQUEST INFORMATION>

HEADER INFORMATION (USER ID, ETC.)
DESIRED MAXIMUM DATA SIZE ※1
LATITUDE/LONGITUDE OF LOWER LEFT/UPPER RIGHT OF RECTANGLE ※2
CENTER POINT ※2
PREFECTURAL/COMMUNAL CODE ※2
ROAD SPECIFICATION (ROAD ATTRIBUTE, ETC.) ※2
LATITUDE/LONGITUDE OF BEGINNING/END FOR PATH SEARCH REQUEST ※3
LATITUDE/LONGITUDE OF CURRENT POSITION + TRAVEL DIRECTION ※3

FIG. 38

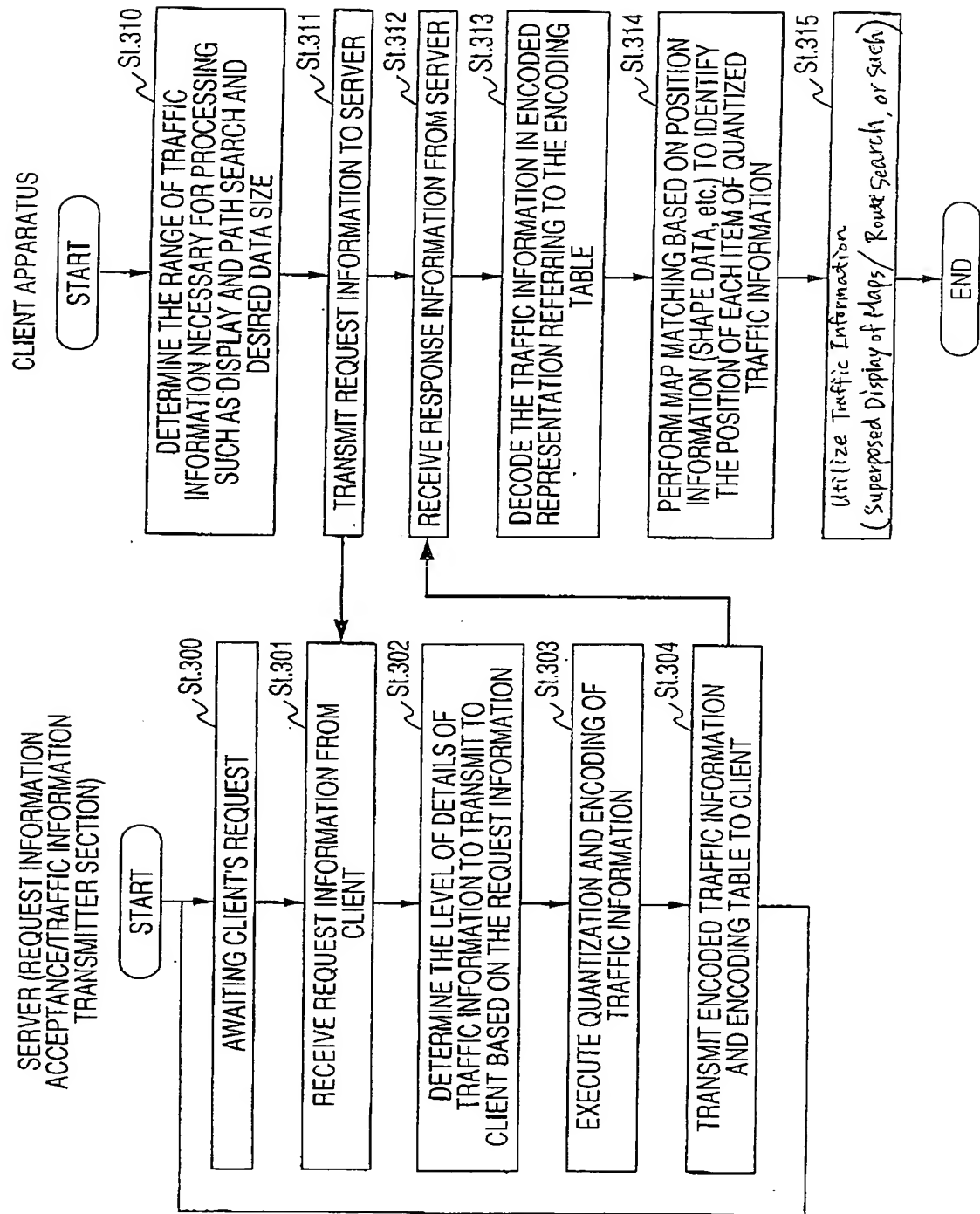


FIG. 39

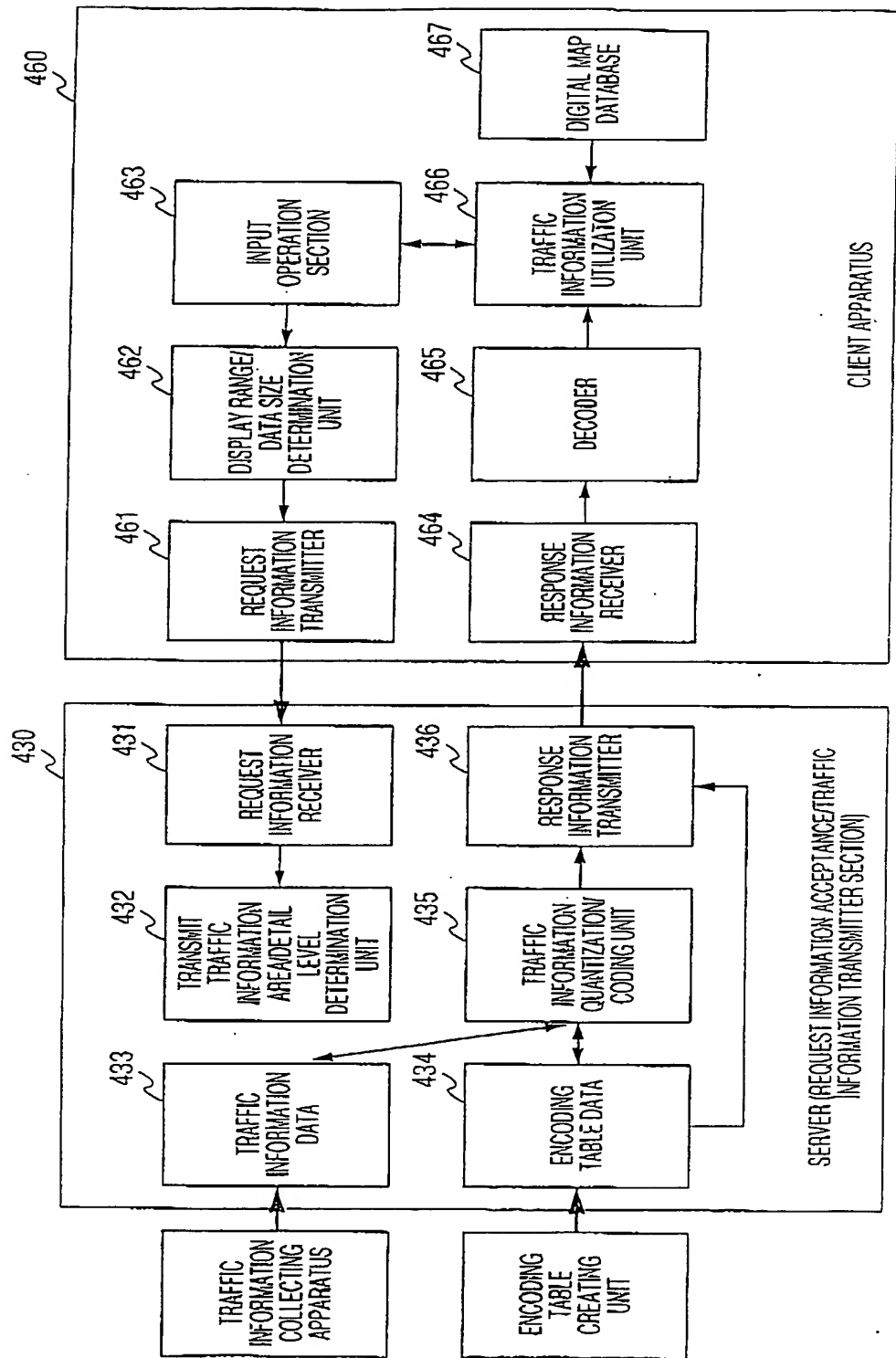


FIG. 40

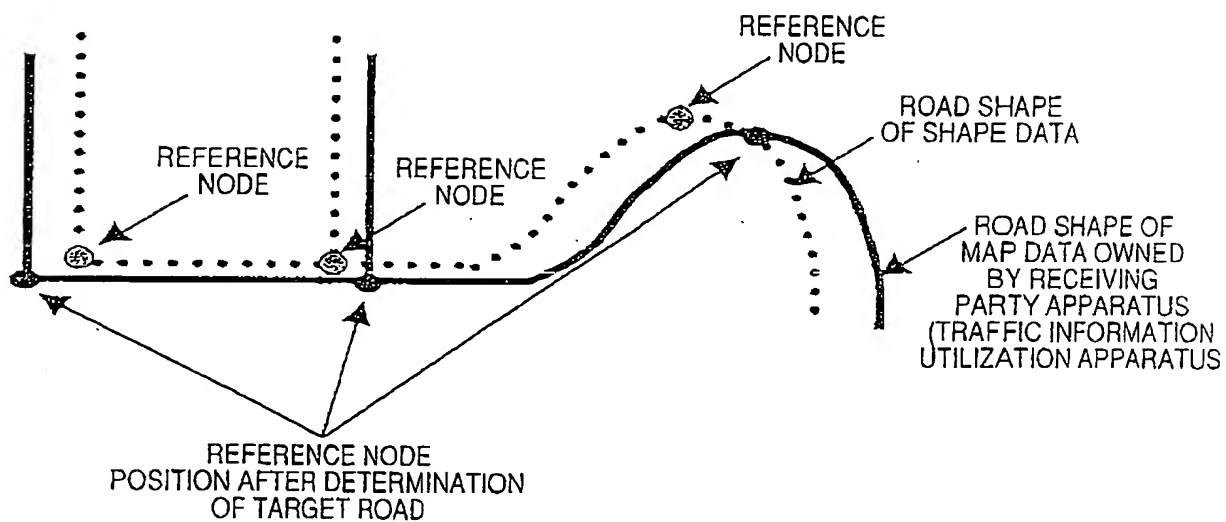


FIG. 41

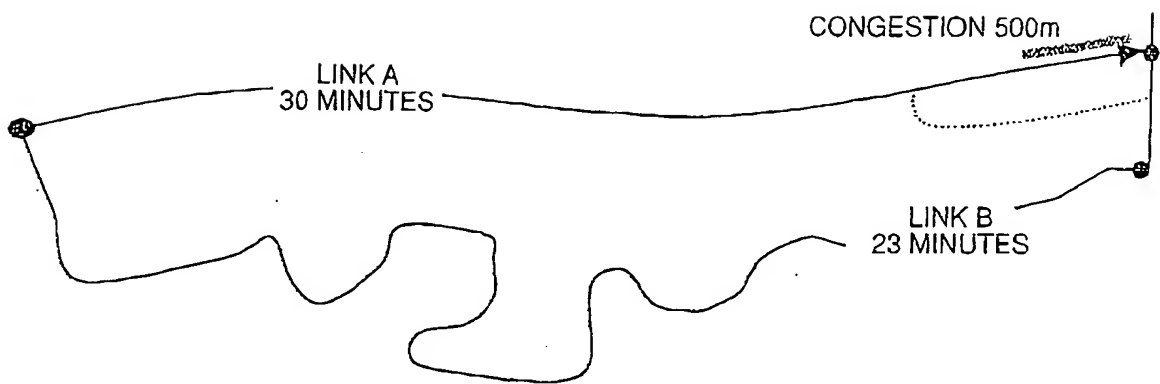


FIG. 42

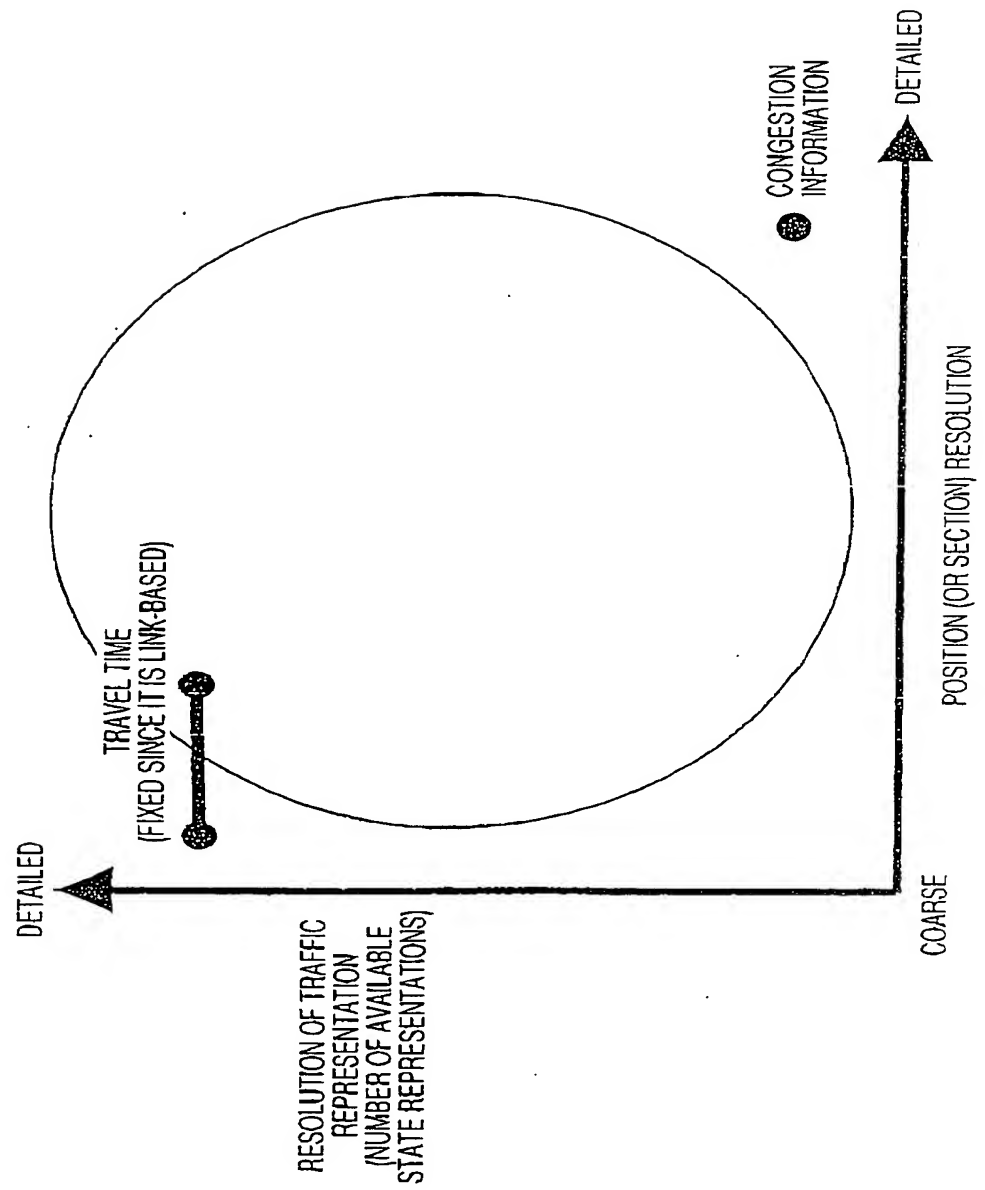


FIG. 43(a)

CURRENT LINK SYSTEM

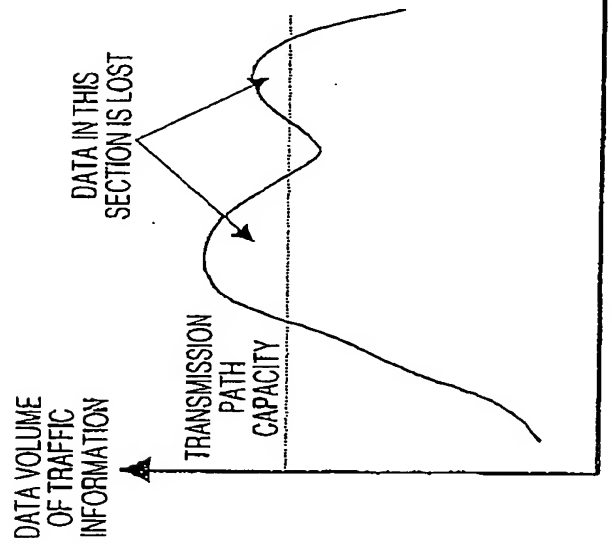


FIG. 43(b)

IDEAL SYSTEM

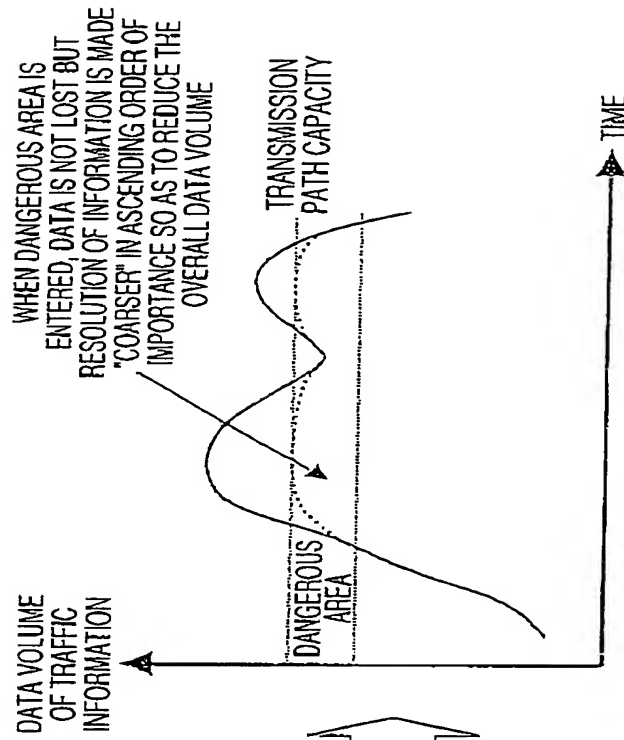


FIG. 44(a)

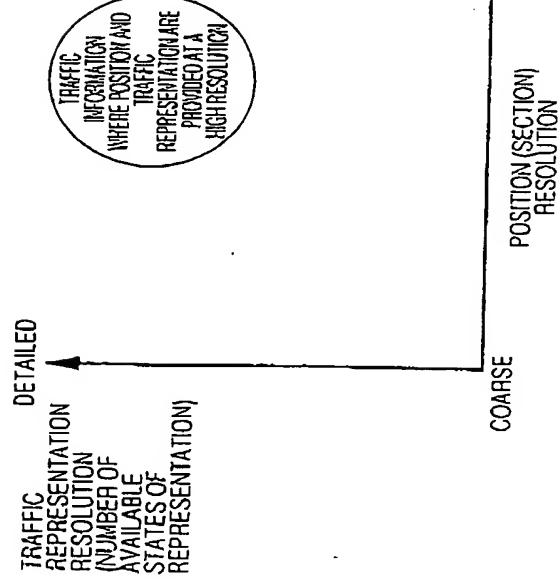


FIG. 44(b)

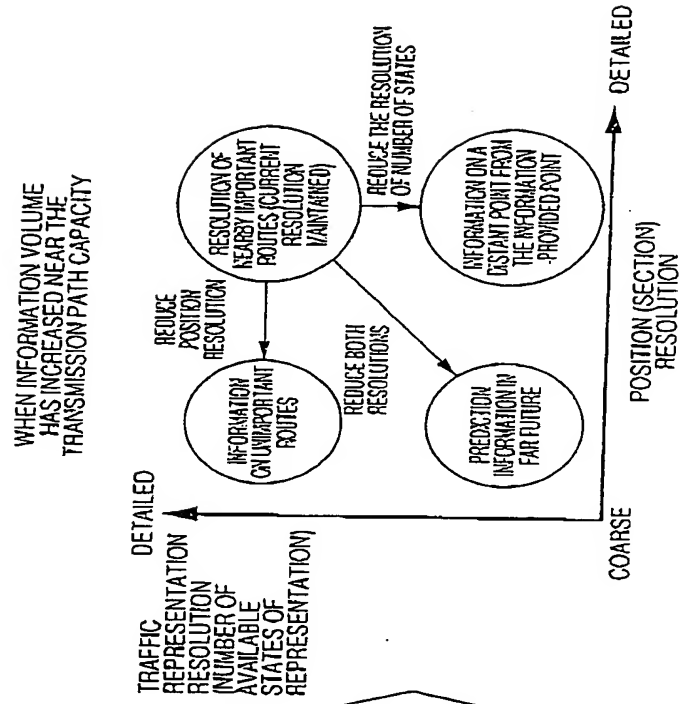


FIG. 45(a)

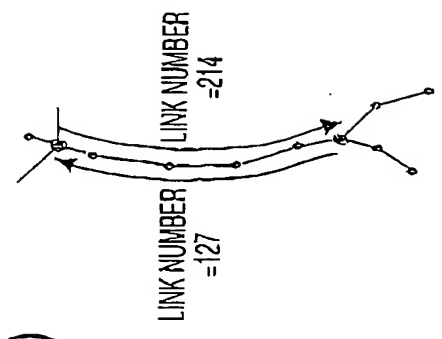


FIG. 45(b)

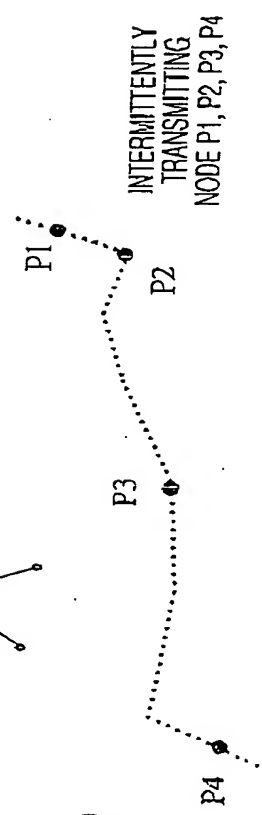


FIG. 45(c)

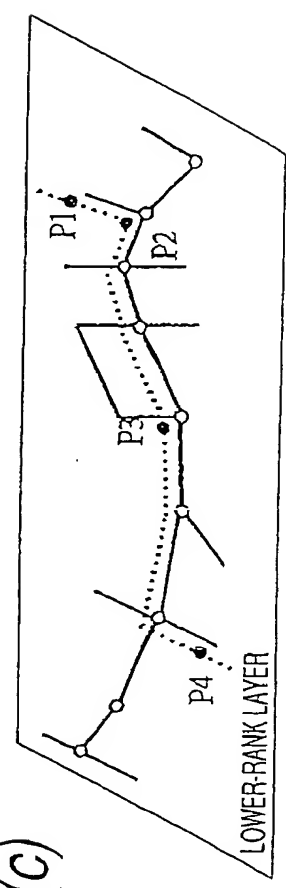
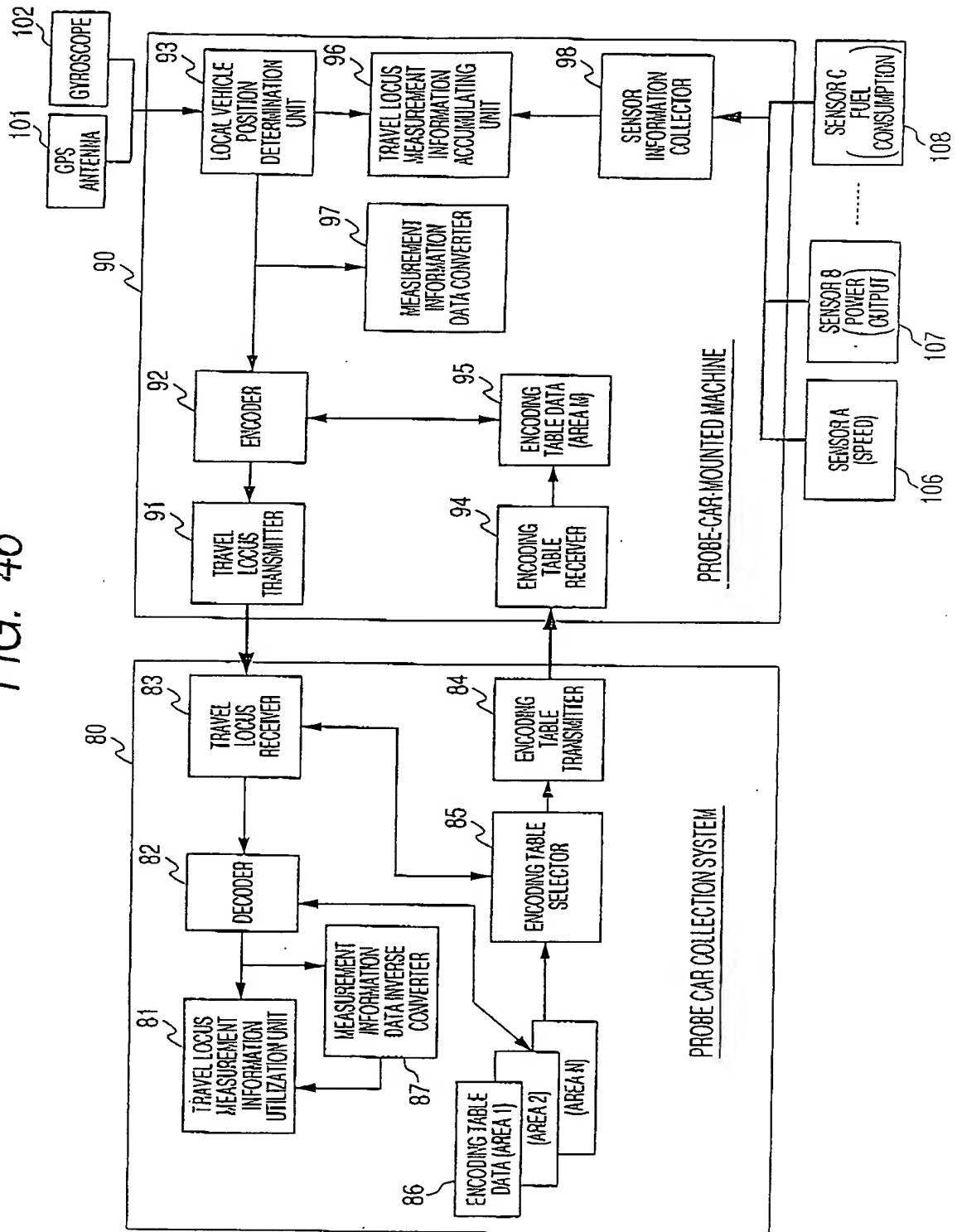


FIG. 46



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